IO24998
-001

Spurling, Norman

From: Steeger, Thomas
Sent: Friday, March 01, 2013 12:30 PM
To: Spurling, Norman
Subject: FW: Pesticide results
Attachments: Pesticide Research 13010309.pdf; EPA-HQ-OPP-2007-0495-0009.pdf; ACB Project B12_24 Utah Samples.pdf

I am forwarding additional information provided Darren Cox; who reported a beekill that took place around July 4, 2012. This is in addition to information that I forwarded in an email dated February 4, 2013.

Also please find attached an analysis of samples by the OPP Analytical Chemistry Branch (file name: ACB Project B12_24 Utah Samples.pdf) ; the analysis was conducted on bee carcass and colony samples collected by Mr. Cox from affected colonies.

Update to IO24875
see also IO24030
IO24068

Tom Steeger

From: Darren Cox [mailto:coxhoney@gmail.com]
Sent: Thursday, January 31, 2013 2:22 PM
To: Steeger, Thomas
Subject: Fwd: Pesticide results

---------- Forwarded message ----------
From: **Susan Kegley** <skegley@pesticideresearch.com>
Date: Wed, Jan 23, 2013 at 3:03 PM
Subject: Fwd: Pesticide results
To: Darren Cox <coxhoney@gmail.com>

Hi Darren,

Here are your pesticide results back from the lab. I took two samples of pollen (from different sides of the frame), one of wax and one of crystallized honey from that frame you sent me. Your samples have sample numbers starting with DC on the attached sample results list. Looks like you have some methoxyfenozide (insecticide with product name of Intrepid, used on a lot of different crops, including almonds, apples, pears, cherries, berries, cotton, citrus, squash, melons, beans, you name it) and a bit of propiconazole (fungicide) in one sample of pollen and the wax. The other pollen sample was clean.

It's hard to tell what the numbers mean in terms of concentrations that are potentially problematic. Methoxyfenozide does not appear to be toxic to adult bees according to the registrant-submitted studies, with an LC50 value of >100 microgram/bee (I think this study result may be incorrect, since the chemical is highly toxic to mosquitoes and aquatic arthropods, and it is odd to have the results for bees be so different). But EPA does indicate (see p. 22 in the attached ecological risk assessment) that methoxyfenozide might be much more toxic to larval honey bees because of its mode of action. The one study that was done on larval bees was not considered acceptable because of a number of flaws in the study.

Oh, and methoxyfenozide is still only conditionally registered, BTW. First brought on line in 2000.

1

Susan

--
Susan E. Kegley, Ph.D., Principal and CEO
Pesticide Research Institute
1400 Shattuck Ave, #8
Berkeley, CA 94709

Phone: (510) 705-1874
Fax: (510) 705-1683
E-mail: skegley@pesticideresearch.com
Web: http://www.pesticideresearch.com

2

Pesticide Research 13010309(2).pdf

Environmental Micro Analysis, Inc. ELAP Certificate #2211 460 N. East Street, Woodland, CA 95776 (530) 666-6890

ENVIRONMENTAL MICRO ANALYSIS, INC.
ANALYTICAL REPORT

CLIENT: Susan Kegley
Pesticide Research Institute
2768 Shasta Rd.
Berkeley , CA 94708

skegley@pesticideresearch.com

January 22, 2013

Phone: (510) 666-9397
Fax:

P. O. No:

Project: Do Cox Hive

Client Sample	EMA Sample No	Sample	Date Analyzed	Method	Chemical	Amount	RL	Units
DC-001	13010309-01	Packed Pollen	01/10/13	OC Screen		ND		
			01/10/13	Pyrethroid Screen		ND		
			01/11/13	OP Screen		ND		
			01/11/13	ON Screen		ND		
			01/16/13	LC/MS/MS Ext1 Screen		ND		
			01/16/13	LC/MS/MS Ext2 Screen	Methoxyfenozide (Intrepid)	2.70	0.1	ppm
			01/16/13	LC/MS/MS Ext2 Screen	Propiconazole (Tilt)	1.31	0.1	ppm
DC-002	13010309-02	Wax	01/10/13	OC Screen		ND		
			01/10/13	Pyrethroid Screen		ND		
			01/11/13	OP Screen		ND		
			01/11/13	ON Screen		ND		
			01/16/13	LC/MS/MS Ext1 Screen		ND		
			01/16/13	LC/MS/MS Ext2 Screen	Methoxyfenozide (Intrepid)	0.56	0.1	ppm
			01/16/13	LC/MS/MS Ext2 Screen	Propiconazole (Tilt)	0.18	0.1	ppm
DC-003	13010309-03	Packed Pollen	01/10/13	OC Screen		ND		
			01/10/13	Pyrethroid Screen		ND		
			01/11/13	OP Screen		ND		
			01/11/13	ON Screen		ND		
			01/16/13	LC/MS/MS Ext1 Screen		ND		
			01/16/13	LC/MS/MS Ext2 Screen		ND		
DC-004	13010309-04	Crystalized Honey	01/10/13	OC Screen		ND		
			01/10/13	Pyrethroid Screen		ND		
			01/11/13	OP Screen		ND		
			01/11/13	ON Screen		ND		
			01/16/13	LC/MS/MS Ext1 Screen		ND		
			01/16/13	LC/MS/MS Ext2 Screen		ND		

Date: 01/22/13 Reviewed by: Donald a. Peterson Don Peterson, Laboratory Director

3

ENVIRONMENTAL MICRO ANALYSIS, INC.
ANALYTICAL REPORT

CLIENT: Susan Kegley
Pesticide Research Institute
2768 Shasta Rd.
Berkeley CA 94708

skegley@pesticideresearch.com

Phone: (510) 666-9397
Fax:

January 22, 2013

P. O. No:

Project: Do Cox Hive

Client Sample	EMA Sample No	Sample	Date Analyzed	Method	Chemical	Amount	RL	Units
SK-001	13010309-05	Wax, Honey, Pollen Mix	01/10/13	OC Screen		ND		
			01/10/13	Pyrethroid Screen		ND		
			01/11/13	OP Screen		ND		
			01/11/13	ON Screen		ND		
			01/16/13	LC/MS/MS Ext1 Screen		ND		
			01/16/13	LC/MS/MS Ext2 Screen		ND		
SK-002	13010309-06	Packed Pollen	01/10/13	OC Screen		ND		
			01/10/13	Pyrethroid Screen		ND		
			01/11/13	OP Screen		ND		
			01/11/13	ON Screen		ND		
			01/16/13	LC/MS/MS Ext1 Screen		ND		
			01/16/13	LC/MS/MS Ext2 Screen	Propiconazole (Tilt)	0.86	0.1	ppm

OC Screen = California Department of Food and Agriculture Organochlorine Screen.
OP/ON Screen = California Department of Food and Agriculture Organophosphate/Organonitrogen Screen.

ND = None Detected at the Reporting Limit (RL)
RL = Reporting Limit.
Excess sample and extracts are stored for a minimum 30 of days from the date of analytical report. Special storage arrangements possible.
Results relate only to items tested.
Samples are analyzed as received.

Date: 01/22/13 Reviewed by: Donald a. Peterson Don Peterson, Laboratory Director

ACB Project B12_24 Utah Samples. pdf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C., 20460
Analytical Chemistry Branch
701 Mapes Road
Fort Meade, Maryland 20755-5350

OFFICE OF
CHEMICAL SAFETY AND POLLUTION
PREVENTION

February 14, 2013

Memorandum

Subject: Analytical Results of Pesticide Screening of Apiculture Samples
ACB project # B12-24

From: Yaorong Qian and Alaa Kamel
Analytical Chemistry Branch
Biological and Economic Analysis Division

Thru: Thuy Nguyen, Chief
Analytical Chemistry Branch
Biological and Economic Analysis Division

To: Tom Steeger
Ecological Risk Branch 4
Environmental Fate and Effects Division

Introduction

The Analytical Chemistry Branch (ACB) was requested to analyze several bee samples collected from two bee kill incidents for the presence of possible pesticide residues. Six bee carcass samples were collected in the vicinity of a bee kill incident in Arizona and one bee carcass sample and one bee hive content sample was collected in another bee kill incident in Utah (Table 1). These samples were received at ACB and stored in a freezer at approximately -80°C until analyses.

for Florence AZ data - See IO24997 IO24877

Sample processing method was adapted form the method used by an AMS (Agricultural Marketing Service) laboratory of USDA at Gastonia, NC. This method has been used by the AMS laboratory for pesticide residue analysis in bee samples. ACB conducted abbreviated method verification for the compounds of interest at several fortification levels. After method verification, these bee samples were extracted and analyzed in one batch with both gas chromatography tandem mass spectrometry (GC/MS/MS) and liquid chromatography-tandem

mass spectrometry (LC/MS/MS) on 11/27/2012. These samples were screened for over 250 pesticide residues and positively identified compounds were quantified. This report contains the positively identified compounds in these samples and the specifically requested compounds that are of interest to EFED.

Table 1. List of samples

Sample label	Sample description	Receiving date	Contact information
UT Bee carcass	Richmond River bottom	7/13/2012	Darren Cox
UT Bee hive content	No label		

I024998

Analytical Method

The analytical method used in sample analysis was based on the method previously used by an USDA laboratory for bee samples. Briefly, after adding appropriate standards, 27 ml of extraction solvent (acetonitrile/water/acetic acid, 55/44/1), which is equivalent to 15 ml of acetonitrile in each sample, was added to each sample. After homogenizing with a polytron tissumizer for 1 minute, 6 g of anhydrous $MgSO_4$ and 1.5 g of sodium acetate was added to each sample. The mixture was vigorous shaking for 2 minutes and centrifuged. Aliquot of the supernatant was then passed through C_{18} SPE cartridges. Dispersive absorbent containing 0.5 g of C_{18}, 0.3 g of primary secondary amine, 0.15 g of graphitized carbon black, and 0.5 g of $MgSO_4$ was added to the eluants and centrifuged after vigorous shaking. Two portions, one for LC/MS/MS and one for GC/MS/MS, of the supernatant were evaporated to near dryness and appropriate internal standard solutions were added to each portion. After adjusting the final volume with solvent, the extracts were transferred to autosampler vials and analyzed with LC/MS/MS and GC/MS/MS. A procedural blank, a control bee sample, and a fortified control bee sample were also processed along with the samples. Calibration standards were prepared with control bee extracts (matrix-matched calibration).

The sample processing and analysis method was verified at ACB by fortifying aliquots of control bee samples at 1, 10, and 30 ppb in triplicates and 3 ppb in five replicates with compounds that are of interest to EFED. The control bee samples used in the fortifications were from a previous study on a controlled bee farm. Average recoveries and the relative standard

deviation (%RSD) from each fortification level are listed in Table 2 for the compounds that were detected in the samples and the compounds that were of interest to EFED. The method was not validated at ACB above 30 ppb, though several compounds were detected above 30 ppb.

Results

The results of pesticide residues in the bee kill samples are listed in Table 3. The values are reported as ng/g (ppb). Percent recovery from the concurrent fortified control bee sample is also listed in the Table 3. The percent recovery of a surrogate compound added to each sample prior to extraction ranged from 85.7% to 125.1% from all the samples (not shown). The amounts of several compounds in the samples were above the highest calibration standard of 120 ng/ml and the sample extracts were diluted and re-analyzed. The values of the diluted samples were reported in Table 3 for those compounds. Compounds detected at or below the detection limits were not included in Table 3.

The remaining un-extracted samples will be stored at -80C° for 3 months from the date of this report and will be disposed unless instructed otherwise.

Please contact us if you have any questions or comments about the data and the report.

7

Table 2. % recovery (accuracy) and % RSD (precision) of method validation*.

	1 ppb		3 ppb		10 ppb		30 ppb		Detection limit (ppb)
	Average	RSD	Average	RSD	Average	RSD	Average	RSD	
Acetamiprid	51.4	14.3	78.7	10.6	102.5	15.1	92.9	12.0	1
Boscalid	62.9	18.9	85.6	8.8	90.6	6.6	101.9	5.3	1
Carbaryl			59.3	33.6	73.0	28.7	67.2	23.2	3
Carbofuran	74.3	19.7	74.6	17.6	98.0	13.7	82.1	11.6	1
Carbofuran 3-OH	62.6	41.6	82.5	18.5	105.5	14.0	92.6	13.7	1
Clothianidin	144.6	15.3	70.2	38.5	79.1	21.7	74.2	12.2	1
Coumaphos			139.6	4.8	104.6	15.7	94.6	7.7	3
DDE-p,p'	94.6	12.0	98.6	12.1	101.8	11.9	96.1	3.2	1
Flonicamid	86.4	27.0	101.5	11.1	82.5	13.5	97.7	12.3	1
Fluvalinate τ	153.6	23.6	109.1	18.0	108.7	9.6	106.1	2.5	1
λ-Cyhalothrin					98.8	3.0	101.0	5.1	10
Malathion			157.8	5.8	131.4	7.0	117.5	3.9	3
Naphthol-1			109.2	3.1	85.3	18.1	90.1	3.8	3
Piperonyl butoxide	73.0	13.4	86.9	8.6	97.7	4.7	99.2	3.9	1
Pendimethalin			170.7	11.6	147.3	22.7	129.4	2.5	3
Propiconazole			85.1	5.1	98.5	9.4	92.5	5.5	3
THPI			108.9	42.4	78.0	21.0	103.9	5.8	3
Thymol					81.7	26.6	98.9	8.7	10

*Quantitative instrument: LC/MS/MS: acetamiprid, carbaryl, carbofuran, 3-hydroxy carbofuran, clothianidin. GC/MS/MS: boscalid, coumaphos, DDE-p,p', flonicamid, τ-fluvalinate, λ-cyhalothrin, malathion, naphthanol-1, piperonyl butoxide, pendimethalin, propiconazole, THPI, thymol.

Table 3. Amount (ppb) of Pesticide Residues Found in Bee Samples.

Sample Descriptor	UT Bee Carcass	UT Bee Hive	%recovery of concurrent fortification
Sample Weight (g)	2.82	2.95	
Acetamiprid			92.0
Boscalid		6	79.6
Carbofuran	37†	2	80.7
Carbofuran 3-OH	190†	4	93.1
Clothianidin			86.7
Coumaphos		15	68.5
DDE-p,p'			73.9
Flonicamid			76.2
Fluvalinate τ		67†	82.6
λ-Cyhalothrin	27		90.8
Malathion		4	83.5
Piperonyl Butoxide		5	79.7
Propiconazole		61†	76.9
THPI	63†		93.6
Thymol	15000*	5000*	70.2
Carbaryl			66.6
Naphthol-1			89.3

LC: acetamiprid, carbofuran, carbofuran 3-OH, clothianidin. GC: Other compounds.
* Value from dilutions.
†The values above 30 ppb (ng/g) are estimated values, because the method performance was verified by fortifications up to 30 ppb.

EPA-HQ-OPP-20070495-0009, pdf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C., 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

PC Code: 121027
DP Barcode: D331985, D337694, D344524
Date: November 15, 2007

MEMORANDUM

SUBJECT: Ecological Risk Assessment for the Methoxyfenozide Section 3 New Uses (Variety of Uses)

TO: Richard Gebken, Risk Manager
Mark Suarez, Risk Manager Reviewer
Registration Division (7505P)

Barbara Madden, Team Lead
Susan Stanton, Environmental Scientist
Minor Use Team
Registration Division (7505P)

FROM: Melissa Panger, Ph.D., Biologist 11-15-07
Marietta Echeverria, Environmental Scientist 11/15/07
Environmental Risk Branch IV
Environmental Fate and Effects Division (7507P)

REVIEWED BY: R. David Jones, Ph.D., Senior Agronomist 11/15/2007
Thomas M. Steeger, Ph.D., Senior Biologist 11/15/07
Environmental Risk Branch IV
Environmental Fate and Effects Division (7507P)

APPROVED BY: Elizabeth Behl, Branch Chief 11-15-07
Environmental Risk Branch IV
Environmental Fate and Effects Division (7507P)

The Environmental Fate and Effects Division (EFED) has completed a review of the Section 3 new use requests for methoxyfenozide [Intrepid® 2F, EPA Reg. No. 62719-442 (22.6 % a.i.)] on a variety of berries, tuberous and corm vegetables (except potato), dry beans, peanuts, grass and nongrass forage, fodder, hay, and straw, avocados, a variety of tropical fruits, and a variety of green onions.

10

Based on the proposed maximum application rates, there is a potential for adverse effects to freshwater invertebrates from acute and chronic exposure to methoxyfenozide for all of the proposed new uses. There is also a potential risk to estuarine/marine invertebrates from all of the proposed uses (except the grass forage use) after chronic exposure and the dry beans and green onion uses after acute exposure. Additionally, the chronic level of concern (LOC) for mammals was surpassed for most of the mammalian size-classes and dietary categories modeled for all of the proposed new uses, using a conservative systemic endpoint that is not clearly linked to growth, survival, or reproduction. There is also the potential for risk to listed insects (specifically lepidopterans) from all of the proposed new uses. Even if the maximum proposed application rate was to drop to 0.1 lb a.i./acre (1 application per year), acute and chronic RQs would still exceed Agency LOCs for freshwater invertebrates. This is because methoxyfenozide is very persistent in the environment and highly toxic to these taxa. The risk to mammals would largely be mitigated (chronic RQs would still exceed the LOC for small mammals that eat short grass) by reducing the application rate to 0.1 lb a.i./acre (2 applications, 30-day minimum application interval).

The combination of high persistence and moderate mobility of methoxyfenozide coupled with the fact that this compound acts through endocrine-mediated pathways (pathways which are common to a broad range of organisms) makes it plausible that this compound may pose a greater long-term ecological risk than what is suggested by the screening-level risk assessments. In particular, once introduced into the environment, this compound could travel to key aquatic environmental compartments and persist for extended periods of time, impacting the endocrine systems of certain aquatic species. Thus, there are significant uncertainties regarding the ecological risks associated with the use of methoxyfenozide.

Due in part to these uncertainties, methoxyfenozide is conditionally registered. The conditional registration requirements included (USEPA, 2000), but were not limited to:

- Developing protocols, obtaining Agency approval, and conducting the following studies:
  - Bi-valve (mussel) bioaccumulation study in sediment
  - Avian reproduction study (a 2-generation study or repeating the bobwhite quail reproduction study with addition of measurements of egg shell strength)
  - Chronic chironomid sediment study using *Chironomus*
  - A sub-acute sediment study using *Hexagenia*
  - Frog embryo teratogenesis assay using *Xenopus* (FETAX)
  - Honey bee brood study
  - Field accumulation study
- Three years after use, obtaining approval for and conducting monitoring of surface water and sediment in a representative sample of high use areas in proximity to surface water.

Of these requirements, the registrant has submitted the following, to date:

- A bioconcentration study using saltwater bivalve mollusks (MRID: 45702704) (this study is classified as acceptable).

11

- A chronic chironomid sediment toxicity test using *Chironomus* (MRID: 45032801) [the study is scientifically sound, supplemental (non-guideline), and fulfills the data requirement]. Additionally, a water-sediment toxicity study using *Culex quinquefasciatus* has also been submitted by the registrant (MRID: 4497690).

- A honey bee brood study (MRID: 45065501) (the study is classified as supplemental and does not fulfill the data requirement for a bee brood study; however, acceptable insect data are available from the open literature).

- A reproduction study with northern bobwhite quail that included egg-shell thickness as an endpoint (MRID: 45652801) (final review is pending).

- Four field accumulation studies: field accumulation in rotational crops (MRID: 45194704); field accumulation in wheat, soybean, turnip, cucumber, mustard greens, tomato and onion rotational crops (MRID: 45870502); long-term accumulation in Washington (MRID: 45702701); field accumulation in rotational crops of the root and tuber, bulb, legume, and grain crop groups (MRID: 46018001).

- The recommendation for a chironomid sediment toxicity test using *Hexagenia* was dropped by EFED since data were available on *Baetis tricaudatus* and the limited availability of *Hexagenia* (MRID: 45702703) (USEPA 2001) (the *Baetis* study was found unacceptable as a definitive study and supplemental as a range-finding study; therefore, this data requirement is not fulfilled).

Additionally, a developmental study of crayfish (MRID: 45702702) has been submitted since Methoxyfenozide's initial Section 3 conditional registration (the study is classified as supplemental).

Therefore, the following requirements are still outstanding:

- A frog embryo teratogenesis assay using *Xenopus* (FETAX)
- Monitoring of surface water and sediment in a representative sample of high use areas in proximity to surface water.
- Definitive sediment toxicity test using either *Hexagenia* or *Baetis*.

Due to continuing uncertainties, especially those related to methoxyfenozide's accumulation in aquatic and sediment habitats, EFED recommends that the registrant fulfill the remaining requirements that are part of methoxyfenozide's conditional registration.

Furthermore, for RD's consideration, the European barberry (one of the proposed new uses), is illegal to grow in some areas of the United States and is considered an invasive species in most others because it is the intermediate host for black wheat rust. Additionally, kudzu (another proposed new use) is spectacularly invasive, especially is the Southerneastern United States.

1. Executive Summary

EFED has completed a review of the Section 3 new use requests for methoxyfenozide [Intrepid® 2F, EPA Reg. No. 62719-442 (22.6 % a.i.)] use on a variety of berries, tuberous and corm vegetables (except potato), dry beans, peanuts, grass and nongrass forage, fodder, hay, and straw, avocados, a variety of tropical fruits, and a variety of green onions. Methoxyfenozide belongs to the diacylhydrazine class of insecticides that interfere with binding of the molting hormone ecdysone to its nuclear receptor thereby resulting in a precocious incomplete molt (and death) in insect larvae, particularly lepidopterans. Methoxyfenozide is the sole active ingredient in Intrepid® 2F, and it is applied aerially or through ground equipment.

The maximum proposed single application rate for the proposed new uses is 0.25 lb a.i./acre (maximum of 4 applications per year at the maximum single application rate; 6-day reapplication interval) with a seasonal maximum of 1.0 lb a.i./acre (avocado and a variety of tropical fruits), and is lower than that of a previous Section 3 request (DP Barcode D249466) for pome fruits, *i.e.*, 1.9 lbs. a.i./acre/season (USEPA, 2001). Based on the proposed maximum application rates, there is a potential for adverse effects to freshwater invertebrates from acute and chronic exposure to methoxyfenozide for all of the proposed new uses. There is also a potential risk to estuarine/marine invertebrates from most of the proposed uses (chronic exposure), and the dry beans and green onion proposed uses (acute exposure). Additionally, the chronic risk level of concern (LOC) for mammals is exceeded for most of the mammalian size-classes and dietary categories modeled for all of the proposed new uses using a conservative systemic endpoint.

EFED has also evaluated whether the proposed methoxyfenozide use rates would impact threatened/endangered species. The proposed new uses of methoxyfenozide have the potential for direct adverse effects on listed and non-listed freshwater invertebrates (acute and chonic exposure), estuarine/marine invertebrates (acute and chronic exposure), listed terrestrial invertebrates (specifically lepidopterans), and listed and non-listed mammals (chronic exposure) (see **Table 1**).

TABLE 1. Listed Species Risks Associated with Potential Direct or Indirect Effects Due to the Applications of Methoxyfenozide for Various Proposed New Uses.

LISTED TAXON	DIRECT EFFECTS	INDIRECT EFFECTS
Terrestrial and semi-aquatic plants - monocots	No	Yes[1]
Terrestrial and semi-aquatic plants - dicots	No	Yes[1]
Insects	Yes	Yes[1]
Birds	No	Yes[1]
Terrestrial-phase amphibians	No	Yes[1]
Reptiles	No	Yes[1]
Mammals	Yes (chronic)	Yes[1]
Aquatic plants	No	Yes[1]
Freshwater fish	No	Yes[1]
Aquatic-phase amphibians	No	Yes[1]
Freshwater crustaceans	Yes (acute and chronic)	Yes[1]
Mollusks	Yes (acute and chronic)	Yes[1]
Marine/estuarine fish	No	Yes[1]
Marine/estuarine crustaceans	Yes (acute and chronic)	Yes[1]

[1]The non-listed LOC was exceeded for freshwater invertebrates (acute and chronic), estuarine/marine invertebrates (acute and chronic), terrestrial invertebrates, and mammals (chronic). Therefore, the potential for adverse effects to those species that rely on a specific animal species (specifically freshwater invertebrates, estuarine/marine invertebrates, terrestrial invertebrates, or mammals) or multiple animal species (specifically freshwater invertebrates, estuarine/marine invertebrates, terrestrial invertebrates and mammals) cannot be precluded. Indirect effects may include general habitat modification, host plant loss, and food supply disruption.

2. Problem Formulation

This assessment evaluates the potential risks to non-target species associated with the proposed new uses of Intrepid® 2F (22.6 % a.i.) insecticide on a variety of berries, tuberous and corm vegetables (except potato), dry beans, peanuts, grass and nongrass forage, fodder, hay, and straw, avocados, a variety of tropical fruits, and a variety of green onions. The proposed maximum application rate for the new uses is 0.25 lbs. a.i./acre/application (for dry beans, various berries, avocados, and various tropical fruits) applied aerially or by ground spray application. The maximum proposed yearly application rate is 1 lb a.i./acre (4 applications at 0.25 lb a.i./acre) with a minimum reapplication interval of 6 days (avocados and various tropical fruits). Methoxyfenozide is already labeled for several other uses, including corn, cotton, cucurbit vegetables, grapes, pome and stone fruits, root vegetables, spearmint and peppermint, berries (including strawberries and cranberries), tree nuts, leafy vegetables, globe artichokes, legume vegetables, a variety of tropical fruits, and black-eyed and Southern peas.

2.1. Analysis Plan

2.1.1. Integration of Exposure and Effects

Available exposure and toxicity data are compared in order to evaluate the risks of adverse ecological effects on non-target species. For this screening-level assessment, the risk quotient (RQ) method is used to compare exposure and toxicity values. The RQ method involves dividing estimated environmental concentrations (EECs) by acute and chronic toxicity values. The resulting RQs are then compared to the Agency's acute and chronic risk levels of concern (LOCs; USEPA 2004; **Table 2**). These criteria are used to indicate if applications of methoxyfenozide, as directed on the proposed labels, have the potential to cause adverse effects to non-target organisms.

TABLE 2. Agency Risk Quotient (RQ) Metrics and Levels of Concern (LOC) Per Risk Class.

RISK CLASS	RISK DESCRIPTION	RQ	LOC
Aquatic Animals (fish and invertebrates)			
Acute	Potential for effects to non-listed animals from acute exposures	Peak EEC/LC_{50}[1]	0.5
Acute Restricted Use	Potential for effects to animals from acute exposures Risks may be mitigated through restricted use classification	Peak EEC/LC_{50}[1]	0.1
Acute Listed Species	Listed species may be potentially affected by acute exposures	Peak EEC/LC_{50}[1]	0.05
Chronic	Potential for effects to non-listed and listed animals from chronic exposures	60-day EEC/NOEC (fish)	1
		21-day EEC/NOEC (invertebrates)	
Aquatic Plants			
Non-Listed	Potential for effects to non-listed plants from exposures	Peak EEC/LC_{50}[1]	1
Listed	Potential for effects to listed plants from exposures	Peak EEC/NOAEC	1
Terrestrial Animals (mammals and birds)			
Acute	Potential for effects to non-listed animals from acute exposures	EEC[2]/LC_{50} (Dietary)	0.5
		EEC/LD_{50} (Dose)	
Acute Restricted Use	Potential for effects to animals from acute exposures Risks may be mitigated through restricted use classification	EEC[2]/LC_{50} (Dietary)	0.2
		EEC/LD_{50} (Dose)	
Acute Listed Species	Listed species may be potentially affected by acute exposures	EEC [2]/LC_{50} (Dietary)	0.1
		EEC/LD_{50} (Dose)	
Chronic	Potential for effects to non-listed and listed animals from chronic exposures	EEC [2]/NOAEC	1
Terrestrial and Semi-Aquatic Plants			
Non-Listed	Potential for effects to non-target, non-listed plants from exposures	EEC/ EC_{25}	1
Listed Plant	Potential for effects to non-target, listed plants from exposures	EEC/ NOEC	1
		EEC/ EC_{05}	

[1] LC_{50} or EC_{50}.
[2] Based on upper bound Kenaga values.

2.4. Mode of Action

Methoxyfenozide belongs to the diacyhydrazine class of insecticides that interferes with the binding of the endogenous steroidal molting hormone 20-hydroxyecdysosone with its nuclear receptor protein complex and as such is referred to as an ecdysteroid agonist (Dhadilla *et al.* 1998; Shimizu *et al.* 1997). This non-steroidal ecdysone agonist induces a precocious incomplete molt in invertebrates, particularly lepidopterans. Although most insect orders have been reported to be unaffected, ecdysteroid agonists have produced lethal effects in lepidopteran, dipteran, and coleopteran larvae; symptoms in affected orders are similar to those expected from

a state of ecdysteroid excess called hyperecdyonism (Dhadialla *et al.* 1998). After ingestion of toxic doses, sensitive larvae stop feeding and the molting process initiates prematurely leading to desiccation and ultimately, death.

2.5. Use Characterization

The proposed labels for the requested new uses for methoxyfenozide have maximum single application rates that range from 0.12 lb a.i./acre (grass forage, fodder, hay, nongrass forage, and straw) to 0.25 lb a.i./acre (various berries, dry beans, avocados, and various tropical fruits) (see **Table 3** for a complete list of proposed new uses and application rates). The proposed maximum seasonal application rates range from 0.5 lb a.i./acre/season [grass forage (Crop Groups 17 and 18), peanuts, and tuberous and corm vegetables (except potato)] to 1 lb a.i./acre/season (dry beans, avocados, a variety of tropical fruits, and a variety of green onions). According to the proposed labels, Intrepid® 2F can be applied via aerial or ground equipment. None of the currently registered Intrepid® 2F uses are registered in New York (according to the active label) and the product cannot be used in Door County, Wisconsin, or within one mile of sandy habitats that support wild lupine plants in the following counties: Allegan, Monroe, Montcalm, Muskegon, Newaygo, Oceana (in Michigan), and Adams, Burnett, Chippewa, Clark, Dunn, Eau Claire, Green Lake, Jackson, Juneau, Marquette, Menominee, Monroe, Oconto, Outagamie, Polk, Portage, Sauk, Shawano, Trempeleau, Waupaca, Waushara, and Wood (in Wisconsin). The Michigan and Wisconsin restrictions were put in place as a result of endangered species assessments that were conducted for the cotton and pome fruit uses (see USEPA, 2000b).

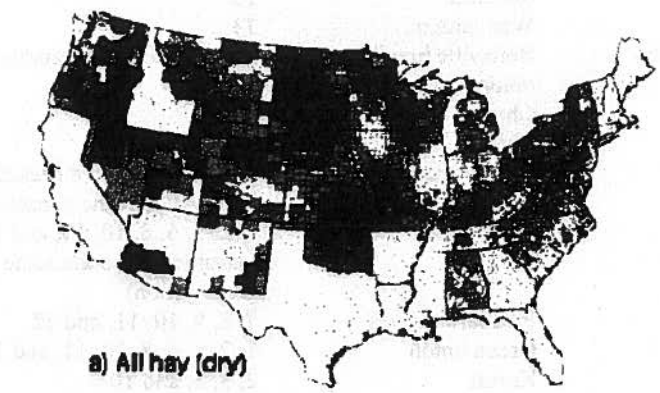
TABLE 3. Requested New Uses for Methoxyfenozide and Proposed Application Rates.

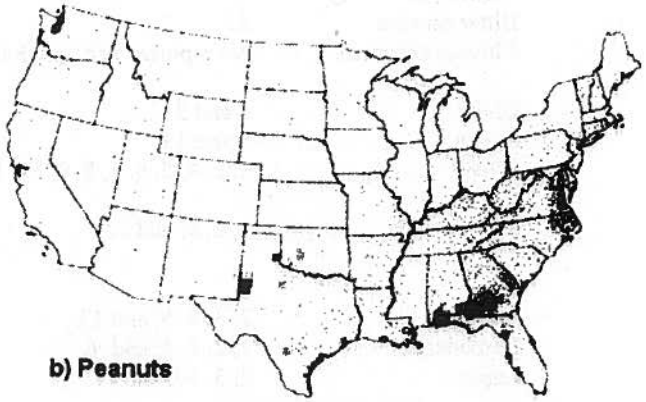
USE(S)	MAX APPLICATION RATE (Single Application)	MAX NUMBER OF APPLICATIONS/ SEASON	MIN APPLICATION INTERVAL	MAX APPLICATION RATE/SEASON
Bushberries[1] Aronia berry Buffalo currant Chilean guava European barberry Highbush cranberry Honeysuckle Jostaberry Juneberry Lingonberry Native currant Salal Sea buckthorn (including cultivators and/or hybrids of each)	0.25 lb a.i/acre	3	7-day	0.75 lb a.i./acre
Dry beans[2]	0.25 lb a.i./acre	4	7-day	1 lb a.i./acre
Grass forage Fodder Hay (Crop Group 17)	0.12 lb a.i./acre	1 per cutting	NS	0.5 lb a.i./acre/year
Peanuts	0.16 lb a.i./acre	3	7-day	0.48 lb a.i./acre
Tuberous and corm vegetables (except potato)[3]	0.16 lb a.i./acre	3	14-day	0.48 lb a.i./acre
Nongrass forage Fodder Straw Hay (Crop Group 18)[4]	0.12 lb a.i./acre	1 per cutting	Not Specified	0.5 lb a.i./acre/year
Avocado	0.25 lb a.i./acre	5 per year	6-day	1 lb a.i./acre/season
Acerola Feijoa Guava Jaboticaba Passionfruit Starfruit Wax jambu	0.25 lb a.i./acre	5 per year	6-day	1 lb a.i./acre/season
Green onion[5]	0.19 lb a.i./acre	6 per year	10-day	1 lb a.i./acre/season

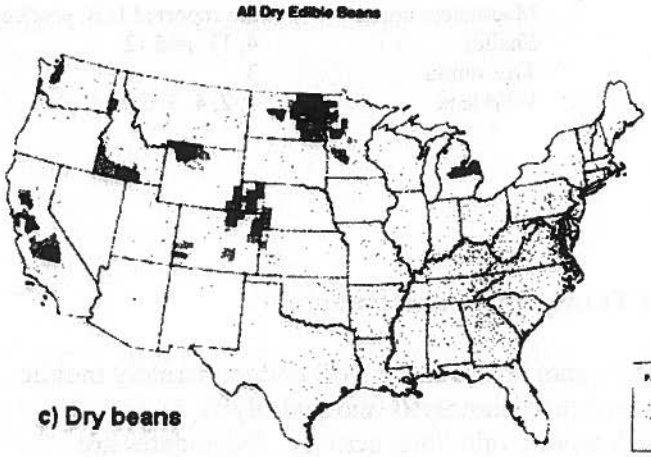
[1] Including, but not limited to: currant, elderberry, gooseberry, highbush blueberry, huckleberry, and lowbush blueberry.
[2] Including, but not limited to: chick peas, garbonzo beans, grain lupine, sweet lupine, white lupine, white sweet lupine, kidney beans, lima beans, mung beans, navy beans, pinto beans, snap beans, waxbeans, broad beans, fava beans, asparagus beans, blackeyed peas, and cowpeas.
[3] Including, but not limited to: Arracacha, arrowroot, bitter cassava, chayote (root), Chinese artichoke, chufa, dasheen, edible canna, ginger, Jerusalem artichoke, leren, sweet cassava, sweet potato, tanier, true yam, tumeric, and yam bean.
[4] Including, but not limited to: Alfalfa, clover, crown vetch, kudzu, lespedeza, lupin, milk vetch, sainfoin, trefoil, velvet bean, and vetch.
5 Including, but not limited to, Beltsville bunching onion, Chinese chive, chive, elegans hasta, fresh onion, fritillaria leaves, green onion, kurrat, lady's leek, leek, macrostem onion, shallot, tree onion, and wild leek.

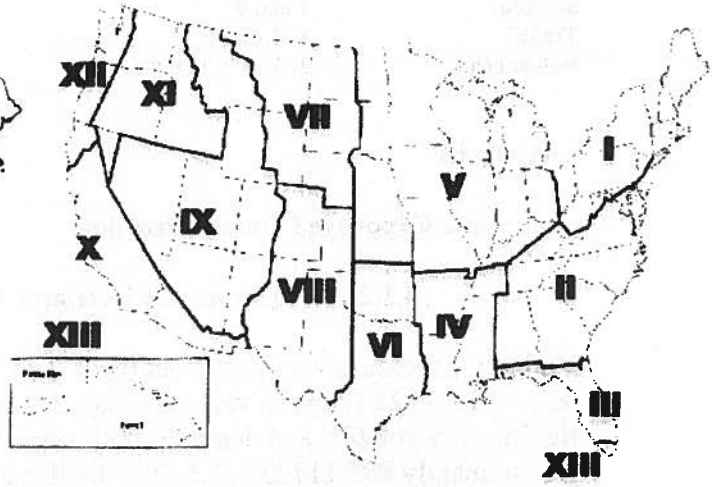
Since these are proposed new uses, data are unavailable to define the historical extent of methoxyfenozide use on the proposed uses in the U.S. In order to characterize potential use sites in the U.S., annual data relevant to harvested acres of the various uses were obtained from USDA's National Agricultural Statistical Service (NASS) (http://www.nass.usda.gov). If NASS data were not available for a particular use, then location information was obtained from U.S.EPA (2006) (for berries) or Markle *et al.* (1998) (for all other uses). As shown on **Fig. 1**, collectively, the potential use sites for the proposed new uses encompass the entire U.S., including Alaska and Hawaii.

FIGURE 1. Geographic Areas for the Proposed Methoxyfenozide New Uses









Remaining Uses (Non-Hay, Non-Peanut, Non-Dry Beans):

USE	PRODUCTION REGION(S)	USE	PRODUCTION REGION(S)
Currant	10, 11, and 12	Vetch	2, 5, 10, and 12
Elderberry	2, 5, and 12	Yam bean	13
Gooseberry	1, 5, 7, and 12	Turmeric	13
Highbush blueberry	1, 2, 5, and 12	True yam	13
Huckleberry	1, 2, 5, and 11	Salal	11 and 12
Lowbush blueberry	1	Dasheen (Taro)	3 and 13
Aronia berry	1,2,4, and 5	Edible canna	13
Buffalo currant	4, 5, 6, 7, and 8	Ginger	13
Chilean guava	2, 3, 4, and 6	Jerusalem artichoke	Northern U.S, 10
European barberry	Most states in the northern U.S	Leren	13
Highbush cranberry	1	Sweet cassava	13
Honeysuckle	No reported U.S. production	Sweet potato	1, 2, 4, and 10
Jostaberry	11	Avocado	3, 6, 10, and 13
Juneberry	Alaska, 5 and 7	Acerola	3, 10 and 13
Lingonberry	1, 5, 11, and 12	Feijoa	CA, FL, and HI

USE	PRODUCTION REGION(S)	USE	PRODUCTION REGION(S)
Native currant	No reported U.S. production	Guava	13
Sea buckthorn	No reported U.S. production	Jaboticaba	13
Arracacha	13	Passionfruit	10 and 13
Arrowroot	13	Starfruit	13
Bitter cassava	13	Wax jambu	13
Chinese artichoke	No reported U.S. production	Beltsville bunching onion	No reported U.S. production
Chufa	2 and 3	Chinese chive	10
Tanier	3 and 13	Chive	10
Clover	1, 2, 4, 5, 6, 7, 8, 9, 10, 11	Elegans hasta	3, 4, 5, 6, 7, and 8 (based on US plant hardiness zones)
Crown vetch	1, 2, 5, and 13	Fresh onion	1, 2, 5, 6, 8, 10, 11, and 12 (assumed to be the same as green onion)
Kudzu	2, 3, 4, 5, and 13	Fritillaria leaves	7, 8, 9, 10, 11, and 12
Lespedeza	1, 2, 4, 5, and 6	Green onion	1, 2, 5, 6, 8, 10, 11, and 12
Lupin	2, 5, 10, and 11	Kurrat	2, 3, 5, and 10
Milk vetch	7, 8, 9, and 11	Lady's leek	No reported U.S. production
Chayote (root)	3, 4, 10, and 13	Leek	2, 3, 5, and 10
Sainfoin	7 and 9	Macrostem onion	No reported U.S. production
Trefoil	1, 2, and 5	Shallot	4, 11, and 12
Velvet bean	2, 3, 4, 5, 6 and 8	Tree onion	3
		Wild leek	1, 2, 4, 5, 6, and 10

3. Analysis

3.1. Exposure Characterization

3.1.1. Environmental Fate and Transport Characterization

Methoxyfenozide is very persistent ($t_{1/2}$ = 1 to 3 years in soil and water) and moderately mobile (K_{oc} = 219 – 922 L/kg$_{oc}$ in various soils). It is stable to photolysis and hydrolysis, is not significantly volatile, and degrades only very slowly by microbial activity. Degradates are predominantly RH-117236 (3,5-Dimethylbenzoic acid N-tert-butyl-N'-(3-hydroxy-2-1nethylbenzoyl)hydrazide) and RH-131154 (3-[N-tert-butyl-N'-(3-methoxy-2-methylbenzoyl)-hydrazinocarbonyl]-5-methylbenzoic acid), but these are only present at low concentrations. Because of its resistance to degradation and its mobility, methoxyfenozide has the potential to accumulate and to move off the site of application by leaching and erosion/runoff. **Table 4** summarizes the physico-chemical properties of methoxyfenozide. For further details on the environmental fate and transport of methoxyfenozide, please refer to the initial Section 3 registration (DP Barcode D249466).

TABLE 4. General Chemical Properties and Environmental Fate Parameters of Methoxyfenozide.

CHEMICAL/FATE PARAMETER	VALUE	SOURCE
Chemical name	n-tert-butyl-N'-[2-methyl-3-methoxybenzoyl]-3,5-dimethylbenzohydrazide	D249466
Molecular mass	368 g/mol	D249466
Vapor pressure (25°C)	2.0×10^{-8} torr	D249466
Solubility (25°C)	3.3 mg/L	D249466
Octanol-water partition coefficient (K_{ow})	$10^{3.72}$	D249466
Organic carbon partitioning coefficient (K_{oc})	267, 922, 678, 219, 365 L/kg_{oc}	MRID 44144433
Hydrolysis half-life (pH 5, 7, 9)	Stable	MRID 44144430
Aqueous photolysis half-life	Stable	MRID 44617805
Soil photolysis half-life	Stable	MRID 44617806
Aerobic soil metabolism half-life	573, 1100, 772, 336 d	MRIDs 44617808, 44617807, 4414432
Aerobic aqueous metabolism half-life	387, 962 d	MRID 44617809
Anaerobic aqueous metabolism half-life	654 d	MRID 44617810
Terrestrial field dissipation half-life	237, 139, 151, 92 d	MRID 44617812, 44617811

3.1.2. Measures of Aquatic Exposure

Tier II modeling for scenarios representing all proposed uses was used to generate EECs. For Tier II, two models are used in tandem: the Pesticide Root Zone Model, (PRZM, Carsel *et al.*, 2005) and the Exposure Analysis Modeling System (EXAMS, Burns, 2004). PRZM (version 3.12.2 dated May 12, 2005) simulates fate and transport on the agricultural field, and EXAMS (version 2.98.04.06 dated April 25, 2005) simulates the fate and resulting daily concentrations in a standard model water body. Simulations are carried out with the linkage program shell, PE 5.0 (November 15, 2006), which incorporates the standard crop and orchard scenarios developed by EFED. Simulations are run for multiple (usually 30) years, and the EECs represent peak values that are expected once every ten years based on the thirty years of daily values generated during the simulation. Additional information on these models can be found at: http://www.epa.gov/oppefed1/models/water/index.htm.

For aquatic endpoints, the exposure is estimated for the maximum application pattern to a 10-ha field bordering a 1-ha pond, 2-m deep (20,000 m^3) with no outlet. Exposure estimates generated using this standard pond are intended to represent a wide variety of vulnerable water bodies that occur at the top of watersheds including prairie pot holes, playa lakes, wetlands, vernal pools,

man-made and natural ponds, and intermittent and first-order streams. As a group, there are factors that make these water bodies more or less vulnerable than the standard surrogate pond. Static water bodies that have larger ratios of pesticide-treated drainage area to water body volume would be expected to have higher peak EECs than the standard pond. These water bodies will be either smaller in size or have large drainage areas. Smaller water bodies have limited storage capacity and thus may overflow and carry pesticide in the discharge, whereas the standard pond has no discharge. As watershed size increases beyond 10-ha, it becomes increasingly unlikely that the entire watershed is planted with a non-major single crop that is all treated simultaneously with the pesticide. Headwater streams can also have peak concentrations higher than the standard pond, but they likely persist for only short periods of time and are then carried and dissipated downstream.

Input Parameters

Input parameters for the PRZM/EXAMS models are listed in **Tables 5** and **6.** Explanations of various model input parameters are discussed below.

TABLE 5. PRZM/EXAMS Application-Specific Input Parameters for Methoxyfenozide.

USE(S)	PRZM SCENARIO	MAX APP RATE (lbs ai/A)	# APPS	INTERVAL	% DRIFT/ EFFICIENCY	IPSCND[2]	DATE OF 1st APP
Bushberries, berries	GA peach	0.25	3	7	0.05/ 0.95	3	2/15th
Dry beans	MI beans	0.25	4	7	0.05/ 0.95	1	6/19th
Grass forage Fodder Hay (Crop Group 17)	FL turf	0.12	4	7 (assumed)	0.05/ 0.95	1	2/15th
Peanuts	NC peanuts	0.16	3	7	0.05/ 0.95	1	5/24th
Tuberous and corm vegetables	NC sweet potato	0.16	3	14	0.05/ 0.95	1	5/29th
Nongrass forage Fodder Straw Hay (Crop Group 18)	PA alfalfa	0.12	4	7 (assumed)	0.05/ 0.95	1	4/30h
Avocado Acerola Feijoa Guava Jaboticaba Passionfruit Starfruit Wax jambu	FL avocado	0.25	4	6	0.05/ 0.95	3	3/15th
Green onion	GA onion	0.19	6	10	0.05/ 0.95	1	9/29th
Pome fruit	PA apple	0.3	6	10	0.05/ 0.95	3	5/4th

TABLE 6. PRZM/EXAMS Chemical-Specific Input Parameters for Methoxyfenozide.

INPUT PARAMETER	VALUE	COMMENT	SOURCE
Molecular Mass (g/mol)	368	Product chemistry data	D249466
Vapor Pressure at 25°C (torr)	2.0×10^{-8}	Product chemistry data	D249466
Solubility in Water at 25°C (mg/L)	33	10X the solubility	D249466
Organic Carbon Partition Coefficient (K_{OC}) (L/kg_{OC})	490	Represents the average K_{OC}.	MRID 44144433
Aerobic Soil Metabolism Half-life (days)	960	Represents the 90th %-ile confidence bound on the mean half-life.	MRIDs 44617808, 44617807, 4414432
Aerobic Aquatic Metabolism Half-life (days)	1559	Represents the 90th %-ile confidence bound on the mean half-life.	MRID 44617809
Anaerobic Aquatic Metabolism Half-life (days)	1962	3x one data point	MRID 44617810
Hydrolysis Half-lives (days)	0	Stable	MRID 44144430
Aqueous Photolysis Half-life (days)	0	Stable	MRID 44617805

Currently approved PRZM scenarios were used in modeling. For the bushberry and other berry use, the GA peach scenario was used as a surrogate since there is not a current southeastern berry scenario to represent blueberries grown in the Southeast. In all cases when multiple scenarios from various geographic areas were available, East Coast scenarios were chosen if available since they generally have greater rainfall which drives off-site transport.

Application methods and rates were obtained from the proposed labels (proposed EPA Reg. No. 62719-442). Application timing of methoxyfenozide is related to various pest pressures. For the purposes of this assessment, it was assumed that applications were made two weeks after crop emergence (as specified in the standard scenarios). Applications were modeled with aerial application input values as specified on the label.

Chemical property input values were chosen in accordance with current input parameter guidance (USEPA, 2002). The upper 90% confidence bound on the mean was selected for the aerobic soil metabolism half-life (960 d) as per current input parameter guidance. The hydrolysis and photolysis were modeled as stable and the upper 90% confidence bound on the mean was selected for the aerobic aquatic metabolism half-life (1559 d) and 3-times the anaerobic aquatic metabolism value was used since there is only one data point. The average k_{oc} value (490) was used for PRZM/EXAMS.

Modeling Results

All proposed use patterns were modeled for surface water exposure estimates, as described above. The maximum use patterns that yielded the maximum surface water EECs lised below in **Table 7** was dry beans. Acute EECs ranged from 9.29 to 123 µg a.i./L; 21-day EECs ranged from 9.18 to 122 µg a.i./L; 60-day EECs ranged from 9.05 to 121 µg a.i./L. Model input/output data for these estimates are attached in **APPENDIX A.**

TABLE 7. PRZM/EXAMS-Predicted Aquatic 1-in-10 Year Estimated Environmental Concentrations (EECs) Resulting from Application of Methoxyfenozide.

USE(S) (modeled rate)	PRZM SSCENARIO	PEAK (µg a.i./L)	21-Day (µg a.i./L)	60-Day (µg a.i./L)
Bushberries, berries (0.75 lb/A/yr)	GA peach	23.0	22.7	22.3
Dry beans (1 lb/A/yr)	MI beans	123	122	121
Grass forage (0.48 lb/A/yr)	FL turf	9.29	9.18	9.05
Peanuts (0.48 lb/A/yr)	NC peanuts	30.3	29.8	29.5
Tuberous and corm vegetables (0.48 lb/A/yr)	NC sweet potato	39.1	38.7	38.4
Nongrass forage (0.48 lb/A/yr)	PA alfalfa	32.2	32.0	31.7
Avocado (1 lb/A/yr)	FL avocado	23.4	23.1	22.8
Tropical fruits (1 lb/A/yr)	FL avocado	23.4	23.1	22.8
Green onion (1 lb/A/yr)	GA onion	56.5	56.0	53.7

Aquatic Exposure Monitoring

Methoxyfenozide was not analyzed in monitoring conducted for the USGS NAWQA program (USGS 2006) or the California Department of Pesticide Regulation (DPR) Surface Water Database (CDPR 2006). OPP is not currently aware of other monitoring data in which methoxyfenozide is an analyte.

3.1.3. Measures of Terrestrial Exposure

3.1.3.1. Terrestrial Animals

T-REX (Version 1.3.1) is used to calculate dietary and dose-based EECs of methoxyfenozide for mammals and birds. Input values for T-REX are located in **Table 8**. Upper-bound Kenega nomogram values are used to derive EECs for methoxyfenozide exposures to terrestrial mammals and birds based on dietary- and dose-based exposures (**Table 9**). A 1-year time period is simulated. Consideration is given to different types of feeding strategies for mammals and birds, including herbivores, insectivores and granivores. For dose-based exposures, three weight classes of mammals (15, 35 and 1000 g) and birds (20, 100, and 1000 g) are considered.

TABLE 8. Input Parameters for Deriving Terrestrial EECs for Methoxyfenozide Use on A Variety of Use-Sites Using T-REX.

PARAMETER DESCRIPTION	USE							
	BERRY	DRY BEAN	GRASS/ NON-GRASS FORAGE	PEANUT	TUB./ CORM VEG.	AVOCADO	TROP. FRUIT	GREEN ONION
Methoxyfenozide Application Rate (lbs a.i./A)	0.25	0.25	0.12	0.16	0.16	0.25	0.25	0.19
Half-life (days)[1]	35	35	35	35	35	35	35	35
Application Interval (days)	7	7	30[2]	7	14	6	6	10
Number of Applications	3	4	4	3	3	4	4	5

[1] Default value

[2] A 30-day application interval was assumed based on crop profiles for alfalfa and hay.

TABLE 9. T-REX-Calculated EECs (ppm) (Upper-Bound Kenaga Values) of Methoxyfenozide on Food Residues for a Variety of Uses.

FOOD TYPE	USE							
	BERRY	DRY BEAN	GRASS/ NON-GRASS FORAGE	PEANUT	TUB./ CORM VEG.	AVOCADO	TROP. FRUIT	GREEN ONION
Short Grass	158	197	58	101	90	203	203	160
Tall Grass	72	90	27	46	41	93	93	73
Broadleaf plants/sm insects	89	111	33	57	50	114	114	90
Fruits/pods/lg insects	10	12	4	6	6	13	13	10

3.2. Ecological Effects Characterization

Methoxyfenozide is very highly toxic to freshwater invertebrates, moderately toxic to freshwater fish, estuarine/marine invertebrates, and estuarine/marine fish, and is practically nontoxic to birds and mammals in terms of acute toxicity (**Table 10**). A summary of available toxicity values for a variety of aquatic and terrestrial taxa are presented in **APPENDIX B**.

TABLE 10. Summary of Specific Assessment Endpoints for Animals and Plants Considered in this Assessment.

TAXA	MEASURE OF EFFECT		
Survival, growth and/ or reproduction of:	**Species**	**Toxicity**	**Endpoint/MRID**
Freshwater Fish	***Acute***		
	Rainbow trout *Oncorhychus mykiss*	LC_{50} = >4.2 mg/L	Mortality/441444-10
	Chronic		
	Fathead minnow *Pimephales promelus*	NOAEC = 0.53 mg a.i./L	Reduced survival/446177-16
Freshwater Invertebrates	***Acute***		
	Midge *Chironomus riparus*	EC_{50} = 0.05 mg a.i./L	Mortality (based on an acute to chronic ratio using data from daphnids)
	Chronic		
	Midge *Chironomus riparus*	NOAEC = 0.0026 mg a.i./L	Delayed emergence and development/450328-01
Estuarine/Marine Fish	***Acute***		
	Sheepshead minnow *Cyprinodon variegatus*	96-hr LC_{50} = > 2.8 mg a.i./L	Mortality/441444-12
	Chronic		
	Sheepshead minnow *Cyprinodon variegatus*	NOAEC = 1.5 mg a.i./L	Reduced growth/446177-12
Estuarine/Marine Invertebrates	***Acute***		
	Eastern oyster *Crassostrea virginica*	96-hr EC_{50} = 1.2	Shell deposition/441444-13
	Chronic		
	Eastern oyster *Crassostrea virginica*	NOAEC = 0.023	Growth (based on an acute to chronic ratio using data from mysids)
Non-Vascular Aquatic Plants	***Acute***		
	Freshwater alga *Selenastrum capricornutum*	120-hr EC50 = >3.4 mg/L	No effects at the highest treatment level tested/446177-18
Birds	***Acute***		
	Colinus virginianus Northern bobwhite quail *Anas platyrhynchos* Mallard duck	LD_{50} = >2,250 mg/kg-bw LC_{50} = >2,250 mg/kg-diet	No effects at highest treatment level tested/441444-06/ 441444-08
	Chronic		
	Colinus virginianus Northern bobwhite quail	NOAEC = 520 mg a.i./kg-diet	Based on egg-shell thinning/446177-11
Mammals	***Acute***		
	Rat	LD_{50} = >5,000 mg a.i./kg-bw	No effects at the highest treatment level tested/441444-15
	Chronic		

TAXA	MEASURE OF EFFECT		
Survival, growth and/ or reproduction of:	**Species**	**Toxicity**	**Endpoint/MRID**
	Rat	NOAEL = 1,552 mg a.i./kg-diet	No adverse effects on reproduction (systemic effects occurred at 200 mg a.i/kg-diet)/446177-31
Terrestrial Invertebrates	***Acute***		
	Honey bee *Apis meliferus*	LD_{50} = > 100 µg/bee (Acute contact)	Mortality/441444-29
	Honey bee *Apis meliferus*	LD_{50} = > 100 µg/bee (Subacute oral)	Mortality/446177-17

3.2.1. Aquatic Effects Characterization

Methoxyfenozide is moderately toxic to freshwater fish, estuarine/marine invertebrates and estuarine/marine fish and highly toxic to freshwater invertebrates on an acute exposure basis **(Table 10)**. Since no toxicity data from acute exposure to methoxyfenozide are available for the most sensitive freshwater invertebrate species (based on chronic exposure), the midge, an acute to chronic ratio (ACR) was used to calculate an acute freshwater invertebrate endpoint using acute and chronic data from daphnids [the most sensitive acute and chronic endpoints available for daphnids are an EC_{50} of 3.7 mg a.i./L and a NOAEC of 0.20 mg a.i./L, respectively]. This results in an LC_{50} of 0.05 mg a.i./L for the midge [(3.7 mg/L)/(0.20 mg/L) = (x mg/L)/(0.0026 mg/L)]. Since no toxicity data from chronic exposure to methoxyfenozide are available for the most sensitive estuarine/marine invertebrate species (based on acute exposure), the Eastern oyster, an acute to chronic ratio (ACR) was used to calculate a chronic estuarine/marine invertebrate endpoint using acute and chronic data from mysids [the most sensitive acute and chronic endpoints available for mysids are an EC_{50} of 1.3 mg a.i./L and a NOAEC of 0.025 mg a.i./L, respectively]. This results in an LC_{50} of 0.023 mg a.i./L for the Eastern oyster [(1.3 mg/L)/(0.025 mg/L) = (1.2 mg/L)/(x mg/L)]. For details on the studies used to derive these endpoints, please refer to the initial methoxyfenozide Section 3 registration (DP Barcode D249466). Additionally, a summary of available toxicity values for a variety of aquatic and terrestrial taxa are presented in **APPENDIX B**.

In addition to the freshwater invertebrate data discussed in the initial methoxyfenozide Section 3 registration (DP Barcode D249466), chronic toxicity data are also available for mayfly larvae (*Baetis tricaudatus*), mosquito larvae (*Culex quinquefasciatus*), and crayfish (*Procambarus clarkia*). The 12-day mayfly study (MRID: 45602703) is unacceptable as a definitive study, supplemental as a range-finding study, and is not adequate for RQ calculation (the NOAEL from the study <10 µg a.i./L, based on emergence); however, it does demonstrate that the effects of methoxyfenozide extend beyond lepidopteran insects. The 28-day mosquito study (MRID: 4497690) is classified as supplemental because the study was not conducted under GLP standards and it did not adhere to current EPA guidelines. The 28-day EC_{50} from the study is 0.21 mg a.i./L, but a NOAEL value is not provided. The crayfish study (MRID: 45702702) is scientifically sound and is classified as supplemental because it is a nonguideline study. In the 32-day study using juvenile crayfish, no adverse affects on survival, growth, or molting were observed at any treatment level (LOAEL > 190 µg a.i./L).

Additionally, a study on the bioaccumulation of methoxyfenozide in Asian clams (*Corbicula fluminea*) was submitted (MRID: 45702704) after the initial methoxyfenozide Section 3 registration (DP Barcode D249466). This study is classified as acceptable. For the two concentrations tested, the whole body mean steady-state bioaccumulation factor was 13X (at the 1.3 µg a.i./L level) and 19X (at the 13 µg a.i./L level). The uptake of methoxyfenozide was rapid; steady-state was achieved within 24 hours of initial exposure. The biological ½ life (50% elimination) occurred during first 24 hours of depuration. The theoretical time to 95% elimination was 17 days for both the 1.3 and 13 µg a.i./L levels. Based on these results, mollusks do not appreciably bioconcentrate methoxyfenozide, and if these organisms are removed to environments devoid of methoxyfenozide, they will depurate the compound relatively rapidly.

3.2.1.1 Indoor Microcosm Study

An indoor microcosm study, designed to measure the response and recovery of aquatic communities exposed to methoxyfenozide, showed effects to both midges (*Chironomus riparus*) and caddis flies (Trichoptera) (MRID: 450328-02). The study concludes that caddis flies were significantly reduced in number at 0.206 mg/L and that midges were affected at the 0.054 mg/L treatment level and higher. Additionally, very few midge larvae completed their development when incubated in microcosm water containing approximately 0.02 mg/L or more of methoxyfenozide.

The microcosm report also concludes that neither phytoplankton nor aquatic invertebrate populations within the microcosm were significantly impacted by exposure to methoxyfenozide. However, this conclusion is based on exposure scenarios that are not considered representative of field conditions. The dosing consisted of two applications based 2-weeks apart with the second treatment at 50% of the initial application rate. Microcosms were then permitted a 10-week recovery period.

The reviewers of this study did not conduct an exhaustive statistical analysis of the microcosm data since it was clear that given the variability within the treatment groups, it would be difficult to detect differences among treatments. However, reduced application rates and the confounding effects of adding fresh food and/or removing sediments from the exposure make it difficult to interpret the results of this study. What can be concluded from the study is that some freshwater aquatic invertebrates are impacted by methoxyfenozide.

3.2.2. Terrestrial Effects Characterization

Methoxyfenozide is practically nontoxic to birds and mammals and highly toxic to terrestrial invertebrates on an acute exposure basis. For details on the available toxicity studies for methoxyfenozide, please refer to the initial methoxyfenozide Section 3 registration (DP Barcode D249466). Additionally, a summary of available toxicity values for a variety of aquatic and terrestrial taxa are presented in **APPENDIX B**.

An additional bobwhite quail reproduction study (MRID: 45652801) was submitted after the initial Section 3 registration that found no treatment-related effects at the highest treatment level tested (1,060 mg a.i./kg-diet), however, this study has only been provisionally reviewed.

Mammalian chronic toxicity data revealed no reproductive effects at methoxyfenozide dietary treatment levels up to 1,552 mg/kg/diet; however, the NOAEL for systemic toxicity is 200 mg/kg/diet (10.2 mg/kg/day) and is based on increased liver weight, histopathological changes in the thyroid, and increased adrenal gland weight (MRID: 446177-31).

The only registrant-submitted data for methoxyfenozide available for terrestrial invertebrates is from honey bees *(Apis mellifera)* (acute contact - MRID: 4414444-29; subacute oral - MRID: 446177-17; brood study MRID: 450655-01). These data indicate that methoxyfenozide is practically non-toxic to adult honey bees on an acute contact and subacute oral exposure basis (see **Table 10**). Because of methoxyfenozide's mode of action, larval insects are expected to be much more sensitive to methoxyfenozide than adult honey bees, but no acceptable acute toxicity data for terrestrial invertebrate larvae have been submitted by the registrant. The honey bee brood study is classified as supplemental because: only one concentration was tested; the percent purity of the test material is not provided; there is no explanation of why the treatment level was selected; there is no clear indication of the actual exposure level in terms of µg/L; and the study does not adequately describe the experimental setup and whether there is any chance that bees from one treatment could consume food from another treatment. This 3-week study found no statistical difference when bees were fed syrup with 101.12 mg a.i./L concentration (only one exposure).

4. Risk Characterization

4.1. Risk Estimation

4.1.1. Aquatic Organisms

In the freshwater fish, estuarine/marine fish, and the non-vascular aquatic plant acute toxicity studies submitted, there were no mortality or sublethal effects at the highest treatment levels tested (*i.e.*, LC_{50} endpoints are 'greater than' values), therefore, these endpoints are not used to calculate RQ values here. They are, however, used to help characterize risk in the 'Risk Description' section of this assessment.

Considering all of the proposed new uses for methoxyfenozide, the highest aquatic EECs generated from the PRZM/EXAMS modeling are for the proposed dry bean use. Using the peak EEC for dry beans to represent acute exposure to fish, aquatic invertebrates, and algae; the 21-day average EEC to represent chronic exposure to aquatic invertebrates; and the 60-day average to represent chronic exposure to fish; the only RQs that exceed the Agency LOCs are the acute and chronic RQs for freshwater and estuarine/marine invertebrates (see **Table 11**).

TABLE 11. Acute and Chronic Toxicity and RQ Values for Methoxyfenozide Use on Dry Beans and Aquatic Organisms.

ACUTE			
TAXA	**LC_{50} or EC_{50} (mg a.i./L)**	**PEAK EEC (mg a.i./L)**	**ACUTE RQ**
Freshwater Invertebrates	0.05	0.123	**2.46**
Estuarine/Marine Invertebrates	1.2		**0.10**
CHRONIC			
TAXA	**NOAEC (mg a.i./L)**	**PEAK 21- or 60-DAY AVERAGE EEC (mg a.i./L)**	**CHRONIC RQ**
Freshwater Fish	0.53	0.121 (60-day)	0.23
Estuarine/Marine Fish	1.5		0.08
Freshwater Invertebrate	0.0026	0.122 (21-day)	**46.9**
Estuarine/Marine Invertebrates	0. 023		**5.3**

Bolded numbers exceed an Agency's LOC.

The freshwater invertebrate acute and chronic RQs for all of the proposed uses of methoxyfenozide exceed Agency LOCs (see **Table 12**). Acute RQs for freshwater invertebrates and all of the proposed uses range from 0.18 to 2.46, and chronic RQs range from 3.5 to 46.9. For estuarine/marine invertebrates, the acute restricted use LOC is exceeded for the dry beans use and the acute listed species LOC is exceeded for the green onion use (acute RQs range from 0.01 to 0.1). The RQs for all of the proposed uses, except grass forage, exceed the Agency's chronic LOC (chronic RQs range from 0.39 to 5.3) (see **Table 13**).

TABLE 12. Acute and Chronic RQ Values for Various Methoxyfenozide Uses and Freshwater Invertebrates.

USE(S)	PEAK EEC (mg a.i./L)	ACUTE RQ	21-Day EEC	CHRONIC RQ
Bushberries	0.023	**0.46**	0.023	**8.8**
Grass Forage	0.009	**0.18**	0.009	**3.5**
Peanuts	0.030	**0.6**	0.030	**11.5**
Tuberous and Corm Vegetables	0.039	**0.78**	0.039	**15**
Nongrass Forage	0.032	**0.64**	0.032	**12.3**
Tropical Fruits	0.023	**0.46**	0.023	**8.8**
Green Onion	0.057	**1.14**	0.056	**21.5**

Bolded numbers exceed an Agency's LOC.

TABLE 13. Acute and Chronic RQ Values for Various Methoxyfenozide Uses and Eastuarine/Marine Invertebrates.

USE(S)	PEAK EEC (mg a.i./L)	ACUTE RQ	21-Day EEC	CHRONIC RQ
Bushberries	0.023	0.02	0.023	**1**
Grass Forage	0.009	0.01	0.009	0.39
Peanuts	0.030	0.03	0.030	**1.3**
Tuberous and Corm Vegetables	0.039	0.03	0.039	**1.7**
Nongrass Forage	0.032	0.03	0.032	**1.4**
Tropical Fruits	0.023	0.02	0.023	**1**
Green Onion	0.057	**0.05**	0.056	**2.4**

Bolded numbers exceed an Agency's LOC.

4.1.2. Terrestrial Organisms

4.1.2.1. Birds

Methoxyfenozide is classified as 'practically nontoxic' to birds on an acute oral and sub-acute dietary exposure basis. In the avian acute and sub-acute toxicity studies submitted, there were no mortality or sublethal effects at the highest treatment levels tested (*i.e.*, the LD_{50} and LC_{50} endpoints are 'greater than' values), therefore, these endpoints are not used to calculate RQ values here. They are, however, used to help characterize risk in the 'Risk Description' section of this assessment.

An avian reproduction study with bobwhite indicates a possible effect on egg shell thinning in bobwhite quail where the two highest treatment groups laid eggs with shell thicknesses significantly ($P < 0.05$) less than controls (MRID: 446177-11). The NOAEC in this study is 520 mg/kg-diet. A follow-up bobwhite quail reproduction study (MRID: 45652801) was submitted that found no treatment-related effects at the highest treatment level tested (1,060 mg a.i./kg-diet), however, this study has only been provisionally reviewed. Using the more sensitive endpoint and the scenario which produces the highest EECs in T-REX (avocados), results in chronic RQs that are all below the Agency's chronic LOCs (RQs range from 0.02 to 0.39) (see **APPENDIX C**).

4.1.2.2. Mammals

Methoxyfenozide is classified as 'practically nontoxic' to mammals on an acute oral exposure basis. In the mammalian acute and chronic toxicity studies submitted, there were no mortality or reproductive effects at the highest treatment levels tested (*i.e.*, the LD_{50}, LC_{50} and NOAEC endpoints are 'greater than' values), therefore, these endpoints are not used to calculate RQ values here. They are, however, used to help characterize risk in the 'Risk Description' section of this assessment.

4.1.2.2. Terrestrial Invertebrates

Methoxyfenozide is classified as 'practically nontoxic' to honey bees but 'highly toxic' to other non-target terrestrial insects on an acute exposure basis. Screening-level risk assessments do not typically evaluate risks to terrestrial invertebrates; however, toxicity information for beneficial insects is used to develop precautionary label language where necessary. Based on the available data from adult honey bees, precautionary label language for bees does not appear necessary. Since methoxyfenozide affects molting, however, larvae honey bees are likely more sensitive than adult honey bees to the chemical. A honey bee brood study found no effects at a concentration of 101.12 mg a.i./L in feed (only one exposure); however, as discussed previously, there are major uncertainties regarding the honeybee brood study. Therefore, the potential risk to beneficial insects (pollinators) remains uncertain.

4.2. Risk Description

The results of this screening-level risk assessment indicate that the proposed new uses of methoxyfenozide on a variety of berries, tuberous and corm vegetables (except potato), dry

beans, peanuts, grass and nongrass forage, fodder, hay, and straw, avocados, a variety of tropical fruits, and a variety of green onions have the potential for direct adverse effects on listed and non-listed freshwater and estuarine/marine invertebrates (acute and chronic exposure). Additionally, there is a potential for adverse effects to listed terrestrial invertebrates and listed and non-listed mammals (chronic exposure) (see below). These results are based on a modeled maximum labeled spray application rates for the various proposed uses. Although direct adverse effects to birds and fish from methoxyfenozide use are not expected, given the potential for effects on terrestrial and aquatic invertebrate species and mammals, indirect effects to all animals are possible.

4.2.1. *Risks to Aquatic Organisms*

The only RQs for aquatic organisms that exceed the Agency's LOCs are the acute and chronic RQs for listed and non-listed freshwater and estuarine/marine invertebrates. The freshwater invertebrate acute and chronic RQs for all of the proposed uses of methoxyfenozide exceed the Agency's listed and non-listed species LOCs. For estuarine/marine invertebrates, the acute restricted use LOC is exceeded for the dry beans use and the acute listed species LOC is exceeded for the green onion use. The RQs for all of the proposed uses, except grass forage, exceed the Agency's chronic LOC for estuarine/marine invertebrates.

Because some of the proposed new uses likely have use sites in proximity to aquatic environments (see **Fig. 1**), there is a potential for risks to freshwater and estuarine/marine invertebrates from the proposed new uses of methoxyfenozide. For the dry bean scenario, reducing the application rate as low as 0.1 lbs ai/acre and limiting the number of applications to 1 per year would not reduce RQ's below the Agency LOCs. At this reduced rate, the acute and chronic RQs would be 0.23 and 4.5, respectively, for freshwater invertabrates. This is because methoxyfenozide is very persistent in the environment and highly toxic to these taxa.

Because there was no mortality or sublethal effects at the highest treatment levels tested in the freshwater fish, estuarine/marine fish, and aquatic non-vascular plant acute toxicity studies submitted, standard RQ values for acute exposures were not calculated in the Risk Characterization section of this assessment. In order to gain a better understanding of how the EECs for the maximum proposed methoxyfenozide application rates for the proposed new uses relate to the toxicity data currently available for these taxa, we calculate RQs using the conservative assumption that the highest values tested in the toxicity studies represent endpoints [*i.e.*, LC_{50} = 4.2 mg a.i./L (freshwater fish); LC_{50} = 2.8 mg a.i./L (estuarine/marine fish); and EC_{50} = 3.4 mg a.i./L (freshwater algae)]. In this exercise, using the use scenario producing the highest EECs (dry beans, peak EEC = 0.123 mg a.i./L), all of the acute RQs are below Agency LOCs (freshwater fish RQ = 0.03; estuarine/marine fish RQ = 0.04; freshwater algae RQ = 0.04). The actual RQs would be much lower than these since no effects were actually identified at the highest treatment levels tested. Therefore, direct risk to freshwater fish, estuarine/marine fish, and non-vascular aquatic plants from acute or chronic exposure to methoxyfenozide from its proposed new uses is not expected. Given the potential for effects on freshwater and estuarine/marine invertebrate species associated with the use of methoxyfenozide (after acute and chronic exposure), however, indirect effects on other taxa are possible.

4.2.2. *Risks to Terrestrial Organisms*

On an acute exposure basis, methoxyfenozide is practically non-toxic to birds, mammals and adult honey bees.

Because there was no mortality or sublethal effects at the highest treatment levels tested in the avian acute oral and sub-acute dietary, and avian reproduction studies submitted, standard RQ values for acute and sub-acute exposures were not calculated in the Risk Characterization section of this assessment. In order to gain a better understanding of how the EECs for the maximum proposed methoxyfenozide application rates for the proposed new uses relate to the toxicity data currently available for birds, we used T-REX to calculate RQs using the conservative assumption that the highest values tested in the avian studies represent endpoints [*i.e.*, acute: LD_{50} = 2,250 mg/kg-bw (northern bobwhite quail); sub-acute: LC_{50} = 2,250 mg/kg diet (northern bobwhite quail)]. In this exercise, using the use scenario producing the highest EECs (avocados), all of the acute and sub-acute RQs calculated using upper bound Kenaga values are between 0 and 0.14 for all size and dietary classes. The RQs for chronic exposure are ≤ 0.39. The actual RQs would be much lower than these since no effects were actually identified at the highest treatment levels tested. Therefore, direct risk to birds from acute, sub-acute, or chronic exposure to methoxyfenozide from its proposed new uses is not expected. Given the potential for effects on freshwater and estuarine/marine invertebrate species associated with the use of methoxyfenozide, however, indirect effects on birds foraging in aquatic environments are possible.

Because there was no mortality or sublethal effects at the highest treatment levels tested in the acute rat study submitted and no reproductive effects in the chronic study, standard RQ values for acute and chronic exposure were not calculated in the Risk Characterization section of this assessment. Calculating RQs using the conservative assumption that the highest value tested in the acute mammalian study represents the endpoint (*i.e.*, acute: LD_{50} = 5,000 mg/kg-bw; NOAEL = 1,552 mg/kg-diet), results in acute RQs that range from 0 to 0.02 for the use scenario producing the highest EECs (avocado). The chronic dose-based RQs range from 0.01 to 1.13, and the dietary-based chronic RQs range from 0.01 to 0.13. The actual RQs would be lower than these since no mortality or reproductive effects were actually identified at the highest treatment levels tested.

Some systemic effects (*i.e.*, increased liver weight, increased adrenal gland weight, and histopathological changes in the thyroid) occurred in rats at treatments levels higher than 200 mg a.i./kg-diet. The relationship of these measurements to our assessment endpoints (*i.e.*, growth, reproduction, and survival) is unclear, however, they do show the potential for systemic effects in mammals after chronic exposure to methoxyfenozide. Using the chronic mammalian systemic toxicity endpoint (NOAEC = 200 mg/kg-diet) does result in chronic RQs that exceed the Agency's chronic LOCs for the proposed uses that produce the highest (avocado) and lowest (grass/non-grass forage) EECs in T-REX [avocado use RQs range from 0.06 to 8.8 (dose-based) and 0.06 to 1 (dietary-based); grass/non-grass forage use RQs range from 0.02 to 2.5 (dose-based) and 0.02 to 0.3 (dietary-based)] (see **Table 14** and **APPENDIX C**).

TABLE 14. Chronic, Dietary- and Dose-Based RQs for Mammals and Methoxyfenozide Use (Avocado and Grass/Non-Grass Forage Uses) Using the Chronic Mammalian Systemic Endpoint.

		DIETARY-BASED RQ		DOSE-BASED RQ	
DIETARY CATEGORY	**BODY SIZE**	**AVOCADO USE**	**GRASS/NON-GRASS FORAGE USE**	**AVOCADO USE**	**GRASS/NON-GRASS FORAGE USE**
Short Grass	**15 g**	**1.01**	0.3	**8.8**	**2.5**
	35 g			**7.5**	**2.2**
	1,000 g			**4.0**	**1.2**
Tall Grass	**15 g**	0.46	0.1	**4.0**	**1.2**
	35 g			**3.4**	**1.0**
	1,000 g			**1.8**	0.5
Broadleaf Plants/Small Insects	**15 g**	0.57	0.2	**4.9**	**1.4**
	35 g			**4.2**	**1.2**
	1,000 g			**2.3**	0.7
Fruits/Pods/Seeds/Large Insects	**15 g**	0.06	0.02	0.6	0.2
	35 g			0.5	0.1
	1,000 g			0.3	0.1
Granivore	**15 g**	N/A	N/A	0.1	0.04
	35 g			0.1	0.03
	1,000 g			0.1	0.02

Bolded numbers indicate RQs that exceed the Agency's chronic risk LOC for mammals

Therefore, direct risk to mammals from acute exposure to methoxyfenozide from its proposed new uses is not expected. However, the chronic RQs for mammals suggest potential effects to mammals that eat short grass, tall grass, and/or broadleaf plants/insects from all of the proposed new uses of methoxyfenozide. The potential for risks to mammals from chronic exposure could be mitigated if the maximum methoxyfenozide application rate was reduced to 2 applications of 0.1 lb a.i./acre (30-day minimum application interval). This results in the following dose-based, chronic RQs for mammals (using T-REX) (**Table 15**):

TABLE 15. Chronic, Dose-Based RQs for Mammals Exposed to Merthoxyfenozide at the Following Application Rate: 0.1 lb a.i./acre, 2 Applications, 30-day Minimum Application Interval.

DIETARY CATEGORY	BODY SIZE	DOSE-BASED RQ
Short Grass	**15 g**	**1.62**
	35 g	**1.38**
	1,000 g	0.74
Tall Grass	**15 g**	0.74
	35 g	0.63
	1,000 g	0.34
Broadleaf Plants/Small Insects	**15 g**	0.91
	35 g	0.78
	1,000 g	0.42
Fruits/Pods/Seeds/Large Insects	**15 g**	0.10
	35 g	0.09
	1,000 g	0.05
Granivore	**15 g**	0.02
	35 g	0.02
	1,000 g	0.01

Terrestrial Invertebrates

EFED does not currently estimate risk quotients for terrestrial non-target invertebrates. However, a label statement is required to protect foraging honeybees when the LD_{50} is < 11 µg/bee. Based on the acute contact and subacute oral toxicity studies to adult honeybees, the LD_{50} for methoxyfenozide is >100 µg/bee. Therefore, the risk for direct adverse effects to adult honey bees is considered low. Because of methoxyfenozide's mode of action, however, larval insects are expected to be much more sensitive to methoxyfenozide than adult honey bees, especially ledpidopteran larvae. Based on an ECOTOX literature search, the most sensitive 96-hr LC_{50} found in the literature (from acceptable studies) is 0.036 mg/kg-diet for the European corn borer (*Ostrinia nubilalis*, Insect Order: Lepidoptera) (Trisyono and Chippendale 1997; ECOTOX No.: 64128). The EECs for the proposed methoxyfenozide use that produces the lowest EECs in T-REX (the grass/non-grass forage use) are well above the lepidopteran dietary LC_{50} [the non-adjusted, dietary-based EECs range from 3.7 ppm (fruits/pods/seeds/ large insects) to 58.3 ppm (short grass)]. This indicates a potential risk to terrestrial invertebrates (especially, but not necessarily limited to, lepidoterans) from all of the proposed new uses of methoxyfenozide.

4.2.3. Review of Incident Data

A search of the EIIS (Environmental Incident Information System) database for ecological incidents (run on October 1, 2007) found no incident reports for methoxyfenozide. There are several limitations with the EIIS database, however, including the fact that incidents involving invertebrates (with the exception of economically beneficial insects such as honey bees) are not normally reported. Thus, the fact that no incidents have been reported does not necessarily mean that no incidents have occurred.

4.2.4. Federally Threatened and Endangered (Listed) Species Concerns

Based on this screening-level assessment, there are potential risks to listed and non-listed freshwater invertebrates, listed and non-listed estuarine/marine invertebrates, listed terrestrial invertebrates, and listed and non-listed mammals from methoxyfenozide use at the maximum application rates for most or all of the proposed new uses (depending on the taxon being considered). Because of the potential risk from direct effects to the listed and non-listed taxa described above, should exposure occur, listed species in all taxa may potentially be affected indirectly due to alterations in their habitat (*e.g.*, food sources, shelter, and areas to reproduce).

4.2.4.1. Co-occurrence Analysis

The goal of the analysis for co-location is to determine whether sites of pesticide use are geographically associated with known locations of listed species [following the convention of the Services, the word 'species' in this assessment may actually apply to a 'species', 'subspecies', or an Evolutionary Significant Unit (ESU)]. At the screening level, this analysis is normally accomplished using the LOCATES (version 2.10.3) database. The database uses location information for listed species at the county level and compares it to agricultural census data (from 2002) for crop production at the same county level of resolution. The product is a listing of federally-listed species that are located within counties known to produce the crops upon which the pesticide will be used. Many of the proposed new uses are not found in LOCATES, so a complete co-occurrence analysis could not be completed.

For the proposed uses that could be analyzed [*i.e.*, blueberries (wild and tame), cranberries, currants, berries (other), dry edible beans, forage, hay and all haylage, grass silage, greenchop, small grain, peanuts, avocados, green onions, ginger root, sweet potatoes, guava, and passion fruit], LOCATES identified a total of 1,238 listed species that overlapped at the county-level with areas where the listed crops are grown. Among these species, 45 are insects, 72 are mammals, and 93 are aquatic invertebrates (including bivalves, coral, and crustaceans) (**Table 16**) (see **APPENDIX D** for a complete species list). Therefore, at the county-level, there is the potential for a total of 210 listed species to be directly and/or indirectly affected by the proposed new methoxyfenozide uses, while 1,028 species may be indirectly affected by the proposed uses of the chemical. If all of the proposed new uses were included, the number of potentially affected listed species would likely increase.

TABLE 16. Tabulation by Taxonomic Group of Listed Species that Occur in Counties with Blueberries (wild and tame), Cranberries, Currants, Berries (other), Dry Edible Beans, Forage Hay and All Haylage, Grass Silage, Greenchop, Small Grain, Peanuts, Avocados, Green Onions, Ginger Root, Sweet Potatoes, Guava, and/or Passion Fruit Use Sites.

TAXA	NUMBER OF SPECIES
Amphibians	18
Arachnid	12
Birds	71
Bivalve	70
Conifer/cycads	3
Coral	1
Crustacean	22
Dicot	599
Ferns & allies	18
Fish	141
Gastropod	71
Insect	45
Lichen	2
Mammal	62
Marine Mammal	10
Monocot	64
Reptiles	29
TOTAL	1,238

This preliminary analysis indicates that there is a potential for methoxyfenozidel use on a variety of berries, tuberous and corm vegetables (except potato), dry beans, peanuts, grass and nongrass forage, fodder, hay, and straw, avocados, a variety of tropical fruits, and a variety of green onions to overlap with listed species (and their designated critical habitat, if applicable) and that a more refined assessment is warranted. The more refined assessment should involve clear delineation of the action area associated with the proposed methoxyfenozide uses and best available information on the temporal and spatial co-location of listed species with respect to the action area. This analysis has not been conducted for this assessment.

5. Literature Cited

Burns, Lawrence (2004). Exposure Analysis Modeling System (EXAMS): User Manual and System Documentation. Ecosystem Research Division, National Exposure Research Laboratory. U. S. Environmental Protection Agency, Athens, GA.

Carsel, R.F., J.C. Imhoff, P.R. Humel, J.M. Cheplick, and A.S. Donigian, Jr. (2005). PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Zones: User's Manual for Release 3.12.2. National Exposure Research Laboratory, Office of Research and Development, U. S. Environmental Protection Agency, Athens, GA.

Dhadialla, T. S., G. R. Carlson, and D. P. Le. (1998). New insecticides with ecdysteroidal and juvenile hormone activity. *Annual Reviews in Entomology* 43: 545 - 569.

Markle, G.M., J. J. Baron, and B.A. Schneider. (1998). *Food and Feed Crops of the United States. Second Ed.*, MeisterPro Reference Guides. Willoughby, Ohio. Monograph # 86, 199, 244, 507, 524, 587.

Shimizu, B., Y. Nakagawa, K. Hattori, K. Nishimura, N. Kurihara, and T. Ueno (1997). Molting hormonal and larvicidal activities of aliphatic acyl analogs of dibenzoylhydrazine insecticides. Steroids 62 (10): 638 - 642.

Trisyono, A., and G. M. Chippendale (1997). Effect of the non-steroidal ecdysone agonists, methoxyfenozide and tebufenozide, on the European corn borer (Lepidoptera; Pyralidae). *J. Econ. Entomol.*, 90: 1486-1492. (ECOTOX No.: 64128).

USEPA (2000). Memo: Conditional Registration of the New Active Ingredient , benzoic acid, 3-methoxy-2-methy-, 2-(3,5-dimethylbenzoyl)-2-(1,1-dimethyl)hydrazide (Methoxyfenozide) a New Insecticide, for Control of Lepedopterian Pests in or on Cotton and Pome Fruits. From James Jones (RD) to Susan Hazen (OPP), dated June 9, 2000.

USEPA (2000a). Memo: Proposed Tiered Mitigation for Methoxyfenozide. From Dirk Young and Thomas Steeher (EFED) to Joseph Tavano and Arnold Layne (RD), dated April 10, 2000.

USEPA (2000b). Memo: Endangered Species Assessment for the Proposed Section 3 Registration of Methoxyfenozide on Apples. From Arthur-Jean Williams (FEAD) to Arnold Layne (RD), dated June 21, 2000.

USEPA (2001a). EFED Risk Assessment for Section 3 Registration of Methoxyfenozide (INTREPID™). From Dirk Young (EFED), Dana Spatz (EFED), and Thomas Steeger (EFED) to Joseph Tavano (RD) and Arnold Layne (RD). DP Barcodes - D249466, D249447, D231307, and D231310.

USEAP (2001b). Addendum to EFED's Review of Proposed Protocols for Data Required Under Conditional Registration for Methoxyfenozide. U.S. Environmental Protection Agency, Office of Pesticide Programs, Environmental Fate and Effects Division. July 25, 2001.

USEPA (2002). Guidance for Selecting Input Parameters in Modeling the Environmental Fate and Transport of Pesticides, Version II. Office of Pesticide Programs. Washington, D.C. February 28, 2002. http://www.epa.gov/oppefed1/models/water/input_guidance2_28_02.htm

USEPA (2004). Overview of the Ecological Risk Assessment Process in the Office of Pesticide Programs. U.S. Environmental Protection Agency, Endangered and Threatened Species Effects Determinations, Office of Prevention, Pesticides and Toxic Substances Office of Pesticide Programs, Washington, D.C. 100 pgs. January 23.

USEPA (2006). Crop Grouping – Part II: Analysis of the USDA IR-4 Petition to Amend the Crop Group Regulation 40 CFR ' 180.41 (c) (13) and Commodity Definitions [40 CFR ' 180.1 (h)] Related to Crop Group 13 Berry. MRID 46797501. Bernard A. Schneider, Ph.D., March 28, 2006.

MRID 441444-06
Campbell, S. M. and J. B. Beavers. 1995a. RH 112,485 technical: an acute oral toxicity study with the Northern bobwhite. Wildlife International Ltd., Easton, MD.

MRID 441444-08
Campbell, S.; Beavers, J. 1995. RH-112,485 Technical: A Dietary LC50 Study with the Mallard: Lab Project Number: 129-157: 95RC-0009: 129/011095/MLCSDT.WC/CHP83. Unpublished study prepared by Wildlife International Ltd. 64 p.

MRID 441444-09
Graves, W. C. and J. P. Swigert. 1995b. RH112,485 technical: a 96-hr flow-through acute toxicity test with the bluegill (*Lepomis macrochirus*). Wildlife International Ltd., Easton, MD. Study # 129A-125.

MRID 441444-10
Graves, W. C. and J. P. Swigert. 1995c. RH112,485 technical: a 96-hr flow-through acute toxicity test with the rainbow trout (*Oncorhynchus mykiss*). Wildlife International. Ltd., Easton, MD. Study # 129A-24.

MRID 441444-11
Holmes, C. M. and J. P. Swigert. 1993. RH 122,485 technical: a 48-hr flow-through acute toxicity test with the cladoceran (*Daphnia magna*). Wildlife International Ltd. Study # 129A-112B.

MRID 441444-12
Graves, W. C. and J. P. Swigert. 1995a. RH112,485 technical: a 96-hr flow-through acute toxicity test with the sheepshead minnow (*Cyprinodon variegatus*). Wildlife International Ltd., Easton, MD.

MRID 441444-13.
Graves, W. C., and J. P. Swigert. 1995d. Deposition test with the Eastern oyster (*Crassostrea virginica*). Wildlife International Ltd. Study # 129A-128.

MRID 441444-14
Graves, W. C., and J. P. Swigert. 1995e. RH-112,485 Technical: a 96-hour flow-through acute toxicity test with the saltwater mysid (*Mysidopsis bahia*). Wildlife International, Ltd., Easton MD.

MRID 441444-15
Gingrich, S.; Parno, J. 1995. RH-112,485: Acute Oral Toxicity Study in Male and Female Rats: Final Report: Lab Project Number: 94P-247: 94R-247. Unpublished study prepared by Rohm and Haas Co. 45 p.

MRID 441444-29
Kirkland, R. 1995. Acute Contact Toxicity of RH-112,485 Technical to Honey Bees: Final Report: Lab Project Number: BIO 166-95: 95RC-0130: 166-95. Unpublished study prepared by Bio Research. 52 p.

MRID 441444-30
Lin, M. 1994. RH-2485 Hydrolysis Study. *Rohm and Haas Technical Report No. 34-94-49.*

MRID 441444-32
Reynolds, J.L. 1996. Aerobic Soil Metabolism of [^{14}C]RH-2485 *Rohm and Haas Technical Report No. 34-96-36.*

MRID 441444-33
Carpenter, D.H. 1996. RH-2485: Soil Adsorption and Desorption. *Rohm and Haas Technical Report No. 34-95-134.*

MRID 446177-10
Frey, L.; Beavers, J.; Martin, K. *et al.* 1998. RH-112,485 Technical: A Reproduction Study with the Mallard (Anas platyrhynchos): Lab Project Number: 97RC-0101: 129-159: RH112,485M-96-1. Unpublished study prepared by Wildlife International Ltd. 316 p.

MRID 446177-11
Bennett, R. S. 1998. Avian reproduction sutdy of RH112,485 technical with Northern bobwhite. Wildlife International Ltd., Easton, MD.

MRID 446177-12
Graves, W. C., M. A. Mank, J. P. Swigert. 1996. RH112,485 technical: an early life stage toxicity test with the sheepshead minnow (*Cyprinodon variegatus*). Wildlife International Ltd., Easton, MD.

MRID 446177-14
Zelinka, E., E. M. Holmes, K. H. Martin, and J. P. Swigert. 1993. RH 112,485 technical: a flow-through life-cycle toxicity test with the cladoceran (*Daphnia magna*). Wildlife International Ltd. Study # 129a-113B.

MRID 446177-15
Graves, W.C., M. A. Mank, and J. P. Swigert. 1996b. RH-112,485 Technical: a flow-through life-cycle toxicity test with the saltwater mysid (*Mysidopsis bahia*). Wildlife International, Ltd., Easton, MD.

MRID 446177-16
Rhodes, J. E. and B. A. Hurshman. 1998. Full life-cycle toxicity of RH 112,485 technical to the fathead minnow (*Pimephales promelas*) under flow-through conditions. ABC Laboratories, Inc., Report # 4370.

MRID 446177-17
Kirkland, R. 1995. Oral Toxicity of RH-112,485 Technical to Honey Bees: Lab Project Number: 167-95: 95RC-0137: 95P-137. Unpublished study prepared by Bio Research. 59 p.

MRID 446177-18
Thompson, S.; Swigert, J. 1995. RH-112,485 Technical: A 5-Day Toxicity Test with the Freshwater Alga (Selenastrum capricornutum): Final Report: Lab Project Number: 129A-130: 95RC-0028: 129/012495/SEL5D2WC/CHP84. Unpublished study prepared by Wildlife International Ltd. 119 p.

MRID 446177-31
Anderson, D.; Gillette, D. 1998. RH-2485 Technical: 24-Month Dietary Chronic/Oncogenicity Study in Rats: Lab Project Number: 94P-226: 94R-226. Unpublished study prepared by Rohm and Haas Company. 4514 p.

MRID 446178-05
Smalley, J. and Reynolds, J.L. 1997. Aqueous Photolysis of [^{14}C]-RH-2485. *Rohm and Haas Technical Report No. 34-96-187.*

MRID 446178-06
Reynolds, J.L. 1997. Soil Photolysis of 14C-RH-2485. *Rohm and Haas Technical Report No. 34-96-135.*

MRID 446178-07
Smalley, J. 1997. Aerobic Soil Metabolism of [^{14}C]RH-2485 in a Loamy Sand from Ohio. *Rohm and Haas Technical Report No. 34-96-188.*

MRID 446178-08
Smalley, J. 1997a. Aerobic Soil Metabolism of [^{14}C]RH-112,2485 in Georgia and Texas Soils. *Rohm and Haas Technical Report No. 34-97-30.*

MRID 446178-09
Smalley, J. 1998. Aerobic Aquatic Metabolism of [14C]-RH-2485. *Rohm and Haas Technical Report No. 34-97-125.*

MRID 446178-10
Kim-Kang, H. and Reynolds, J.L. 1996. Anaerobic Aquatic Metabolism of [14C]RH-2485. *Rohm and Haas Technical Report No. 34-96-37.*

MRID 446178-11
Dong, L. 1998b. Terrestrial Field Dissipation of RH-2485 on Bare Soil in Washington. *Rohm and Haas Technical Report No. 34-98-96.*

MRID 446178-12
Dong, L. 1998. Terrestrial Field Dissipation of RH-2485 on Bare Soil in California, Georgia, Texas, and Washington (Final Report for California, Georgia, and Texas Sites). *Rohm and Haas Technical Report No. 34-98-96.*

MRID 446178-13
Gu, Z. 1997. RH-2485 Bioconcentration and Elimination of 14C-Residues by Bluegill Fish. *Rohm and Haas Technical Report No. 34-97-13.*

MRID: 44976901
Heimbach, F. (1999). Influence of RH-2485 (tech.) on Development and Emergence of Larvae of Culex quinquefasciatus in a Water-Sediment System: Lab Project Number: HBF/CH 37: CH 14/99. Unpublished study prepared by Bayer AG. 31 p.

MRID: 450328-01
Kolk, J. 2000. RH-2485 Technical: Chronic Effects on Midge Larvae (Chironomus riparius) in Water/Sediment System: Final Report: Lab Project Number: 99P-001: 1007.051.173: 99RC-0001. Unpublished study prepared by Springborn Labs. (Europe) AG. 119 p.

MRID: 450328-02
Giddings, J. 1999. Response and Recovery of Aquatic Communities Exposed to RH-2485 240 SC in Indoor Microcosms Representing Shallow Freshwater Lentic Ecosystems: Final Report: Lab Project Number: 99RC-0052: HBF/MT 09: 86.6233. Unpublished study prepared by Springborn Labs., Inc. 295 p.

MRID: 45065501
Schmitzer, S. (1997). Study on the Effects of RH 2485 SC 240 (Insect Growth-Regulating Insecticide) on Honey Bee Brood (Apis mellifera L.) (Hymenoptera, Apidae): Lab Project Number: 2520031: 98RC-1007. Unpublished study prepared by IBACON GmbH. 34 p.

MRID: 45194704
Sharma, A. (2000). RH-2485 80W Field Accumulation in Rotational Crops: Lab Project Number: 34P-98-79: TR 34-00-07: 34-99-196. Unpublished study prepared by South Texas Ag Research and Research for Hire. 490 p. {OPPTS 860.1900}.

MRID: 45652801
Mitchell, L.; Martin, K.; Beavers, J.; et al. (2001). RH-112,485 Technical: A Reproduction Study with the Northern Bobwhite Quail: Final Report: Lab Project Number: 01RC-0091: 129-177. Unpublished study prepared by Wildlife International, Ltd. 237 p.

MRID: 45702701
Deakyne, R. (2002). RH-2485 Long--Term Accumulation Study in Washington: Lab Project Number: 34-01-84: 34P-96-28: 34P-96-28D. Unpublished study prepared by Qualls Agricultural Laboratory, Inc., Grayson Research, LLC and Centre Analytical Laboratories, Inc. 508 p.

MRID: 45702702
Sousa, J. (2002). Methoxyfenozide (RH-2485) Technical: Effects on Early Life-Stage Molting and Growth in Red Swamp Crayfish (Procambarus clarkii): Lab Project Number: 12550.6188: 011267: 86.6234. Unpublished study prepared by Springborn Smithers Laboratories. 89 p. {OPPTS 850.1400, 850.1300}.

45702703
Stubblefield, W. (2002). RJ-2485 240 SC Toxicity Test Results with the Mayfly, Baetis tricaudatus: Lab Project Number: BJK061802: 99RC-0269. Unpublished study prepared by ENSR. 7 p.

MRID: 45702704
Dionne, E. (2002). RH-112,485 Technical--Flow-Through Bioconcentration Study with Asian Clams (Corbicula fluminea): Lab Project Number: 86.6242: 01RC-0090: 01P-090. Unpublished study prepared by Springborn Smithers Laboratories. 71 p. {OPPTS 850.710).

MRID: 45870502
Barney, W. (2003). RH-2485 80W Field Accumulation Study in Wheat, Soybean, Turnip, Cucumber, Mustard Greens, Tomato and Onion Rotational Crops: Lab Project Number: 34P-00-05: 21800011: 21800012. Unpublished study prepared by Grayson Research, LLC and SFBC Analytical Laboratories Inc. 850 p. {OPPTS 860.1900}.

MRID: 46018001
Barney, W. (2003). RH-2485 80W Field Accumulation Study in Rotational Crops of the Root and Tuber, Bulb, Legume and Grain Crop Groups. Project Number: 34P/01/01, 21801003, 21801004. Unpublished study prepared by Grayson Research, Ltd. 588 p.

MRID: 467975-01
Chen, H. 2006. Crop Grouping Petition - Berry and Small Fruit Group 13, Technical Amendment to 40 CFR 180.41 (c)(13) and 180.1 (h). Unpublished study prepared by Interregional Research Project No. 4. 592 p.

APPENDIX A: PRZM/EXAMS Runs for Methoxyfenozide.

stored as FLavocado.out
Chemical: methoxyfenozide
PRZM environment: FLavocadoSTD.txt modified Tueday, 29 May 2007 at 12:44:32
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w12839.dvf modified Wedday, 3 July 2002 at 09:04:28
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	2.585	2.542	2.383	2.16	2.16	1.587
1962	4.381	4.336	4.172	3.923	3.822	3.259
1963	6.011	5.965	5.795	5.687	5.591	4.921
1964	8.178	8.139	7.994	7.782	7.691	6.762
1965	9.734	9.684	9.498	9.38	9.238	8.574
1966	11.67	11.64	11.52	11.43	11.3	10.53
1967	13.25	13.2	13.08	12.81	12.65	11.84
1968	14.11	14.06	13.91	13.78	13.75	12.94
1969	14.83	14.78	14.58	14.27	14.08	13.14
1970	15.01	14.96	14.8	14.51	14.41	13.58
1971	15.3	15.25	15.05	14.75	14.58	13.71
1972	15.37	15.33	15.17	14.97	14.9	14.06
1973	15.78	15.73	15.53	15.21	15.02	14.08
1974	15.53	15.47	15.27	14.96	14.81	13.86
1975	15.3	15.24	15.04	14.72	14.53	13.54
1976	15	14.95	14.75	14.44	14.26	13.37
1977	18.6	18.54	18.25	17.87	17.69	15.67
1978	18.16	18.1	17.89	17.57	17.36	16.27
1979	28.96	28.74	27.91	26.57	25.87	21.4
1980	25.02	24.95	24.68	24.23	23.97	22.59
1981	23.49	23.42	23.19	22.82	22.59	21.48
1982	23.03	22.96	22.72	22.33	22.2	20.93
1983	21.94	21.88	21.67	21.33	21.13	20
1984	20.94	20.89	20.68	20.47	20.45	19.52
1985	20.76	20.7	20.49	20.15	19.95	19.02
1986	20.43	20.37	20.15	19.81	19.6	18.41
1987	19.38	19.32	19.12	18.8	18.59	17.63
1988	18.89	18.84	18.62	18.29	18.13	17.11
1989	18.23	18.17	17.96	17.63	17.42	16.37
1990	17.87	17.81	17.6	17.32	17.19	16.14

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			28.96	28.74	27.91	26.57	25.87	22.59
0.0645161290322581			25.02	24.95	24.68	24.23	23.97	21.48
0.0967741935483871			23.49	23.42	23.19	22.82	22.59	21.4
0.129032258064516			23.03	22.96	22.72	22.33	22.2	20.93
0.161290322580645			21.94	21.88	21.67	21.33	21.13	20
0.193548387096774			20.94	20.89	20.68	20.47	20.45	19.52
0.225806451612903			20.76	20.7	20.49	20.15	19.95	19.02
0.258064516129032			20.43	20.37	20.15	19.81	19.6	18.41
0.290322580645161			19.38	19.32	19.12	18.8	18.59	17.63
0.32258064516129	18.89		18.84	18.62	18.29	18.13	17.11	
0.354838709677419			18.6	18.54	18.25	17.87	17.69	16.37
0.387096774193548			18.23	18.17	17.96	17.63	17.42	16.27
0.419354838709677			18.16	18.1	17.89	17.57	17.36	16.14
0.451612903225806			17.87	17.81	17.6	17.32	17.19	15.67
0.483870967741936			15.78	15.73	15.53	15.21	15.02	14.08
0.516129032258065			15.53	15.47	15.27	14.97	14.9	14.06
0.548387096774194			15.37	15.33	15.17	14.96	14.81	13.86
0.580645161290323			15.3	15.25	15.05	14.75	14.58	13.71
0.612903225806452			15.3	15.24	15.04	14.72	14.53	13.58
0.645161290322581			15.01	14.96	14.8	14.51	14.41	13.54

0.677419354838715	14.95	14.75	14.44	14.26	13.37	
0.709677419354839	14.83	14.78	14.58	14.27	14.08	13.14
0.741935483870968	14.11	14.06	13.91	13.78	13.75	12.94
0.774193548387097	13.25	13.2	13.08	12.81	12.65	11.84
0.806451612903226	11.67	11.64	11.52	11.43	11.3	10.53
0.838709677419355	9.734	9.684	9.498	9.38	9.238	8.574
0.870967741935484	8.178	8.139	7.994	7.782	7.691	6.762
0.903225806451613	6.011	5.965	5.795	5.687	5.591	4.921
0.935483870967742	4.381	4.336	4.172	3.923	3.822	3.259
0.967741935483871	2.585	2.542	2.383	2.16	2.16	1.587

0.1	23.444	23.374	23.143	22.771	22.551	21.353

Average of yearly averages: 14.4097666666667

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: FLavocado
Metfile: w12839.dvf
PRZM scenario: FLavocadoSTD.txt
EXAMS environment file: pond298.exv
Chemical Name: methoxyfenozide

Description	Variable	Name	Value	Units	Comments
Molecular weight	mwt	368	g/mol		
Henry's Law Const.	henry		atm-m^3/mol		
Vapor Pressure	vapr	2e-8	torr		
Solubility	sol	33	mg/L		
Kd	Kd		mg/L		
Koc	Koc	490	mg/L		
Photolysis half-life	kdp	0	days	Half-life	
Aerobic Aquatic Metabolism	kbacw	1559	days	Halfife	
Anaerobic Aquatic Metabolism	kbacs	1962	days	Halfife	
Aerobic Soil Metabolism	asm	960	days	Halfife	
Hydrolysis:	pH 7	0	days	Half-life	
Method: CAM	2	integer	See PRZM manual		
Incorporation Depth:		DEPI		cm	
Application Rate:	TAPP	0.28	kg/ha		
Application Efficiency:		APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond		
Application Date	Date	15-3	dd/mm or dd/mmm or dd-mm or dd-mmm		
Interval 1 interval	6	days	Set to 0 or delete line for single app.		
app. rate 1	apprate		kg/ha		
Interval 2 interval	6	days	Set to 0 or delete line for single app.		
app. rate 2	apprate		kg/ha		
Interval 3 interval	6	days	Set to 0 or delete line for single app.		
app. rate 3	apprate		kg/ha		
Record 17:	FILTRA				
	IPSCND	3			
	UPTKF				
Record 18:	PLVKRT				
	PLDKRT				
	FEXTRC	0.5			
Flag for Index Res. Run	IR	EPA Pond			
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)		

stored as Flturf.out
Chemical: methoxyfenozide
PRZM environment: FLturfSTD.txt modified Tueday, 21 February 2006 at 14:38:26
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w12834.dvf modified Wedday, 3 July 2002 at 09:04:28
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly

1961	1.188	1.169	1.098	0.9906	0.9413	0.731
1962	1.954	1.935	1.863	1.765	1.746	1.554
1963	2.775	2.755	2.68	2.567	2.516	2.31
1964	3.451	3.431	3.363	3.278	3.284	3
1965	4.074	4.054	3.977	3.86	3.797	3.508
1966	4.761	4.74	4.664	4.576	4.552	4.229
1967	5.272	5.25	5.17	5.046	4.976	4.695
1968	5.845	5.826	5.759	5.638	5.563	5.249
1969	6.267	6.245	6.167	6.043	5.991	5.638
1970	6.523	6.5	6.418	6.29	6.212	5.773
1971	6.658	6.638	6.566	6.488	6.439	6.049
1972	7.58	7.548	7.429	7.231	7.129	6.604
1973	7.46	7.437	7.351	7.22	7.14	6.685
1974	7.404	7.381	7.295	7.165	7.085	6.646
1975	7.39	7.367	7.282	7.179	7.113	6.664
1976	8.733	8.69	8.531	8.288	8.158	7.432
1977	8.346	8.323	8.233	8.098	8.017	7.602
1978	8.642	8.618	8.526	8.367	8.3	7.84
1979	8.805	8.777	8.675	8.506	8.476	7.99
1980	8.708	8.684	8.597	8.466	8.383	7.889
1981	8.748	8.723	8.63	8.488	8.399	7.882
1982	8.998	8.97	8.867	8.689	8.604	8.107
1983	9.221	9.205	9.112	8.958	8.868	8.312
1984	9.606	9.575	9.462	9.345	9.339	8.792
1985	9.557	9.533	9.443	9.312	9.228	8.71
1986	9.3	9.277	9.19	9.056	8.971	8.522
1987	9.167	9.144	9.058	8.987	8.915	8.396
1988	9.036	9.017	8.932	8.798	8.713	8.212
1989	8.835	8.811	8.722	8.587	8.517	8.03
1990	8.96	8.932	8.828	8.679	8.587	8.013

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			9.606	9.575	9.462	9.345	9.339	8.792
0.0645161290322581			9.557	9.533	9.443	9.312	9.228	8.71
0.0967741935483871			9.3	9.277	9.19	9.056	8.971	8.522
0.129032258064516			9.221	9.205	9.112	8.987	8.915	8.396
0.161290322580645			9.167	9.144	9.058	8.958	8.868	8.312
0.193548387096774			9.036	9.017	8.932	8.798	8.713	8.212
0.225806451612903			8.998	8.97	8.867	8.689	8.604	8.107
0.258064516129032			8.96	8.932	8.828	8.679	8.587	8.03
0.290322580645161			8.835	8.811	8.722	8.587	8.517	8.013
0.32258064516129	8.805		8.777	8.675	8.506	8.476	7.99	
0.354838709677419			8.748	8.723	8.63	8.488	8.399	7.889
0.387096774193548			8.733	8.69	8.597	8.466	8.383	7.882
0.419354838709677			8.708	8.684	8.531	8.367	8.3	7.84
0.451612903225806			8.642	8.618	8.526	8.288	8.158	7.602
0.483870967741936			8.346	8.323	8.233	8.098	8.017	7.432
0.516129032258065			7.58	7.548	7.429	7.231	7.14	6.685
0.548387096774194			7.46	7.437	7.351	7.22	7.129	6.664
0.580645161290323			7.404	7.381	7.295	7.179	7.113	6.646
0.612903225806452			7.39	7.367	7.282	7.165	7.085	6.604
0.645161290322581			6.658	6.638	6.566	6.488	6.439	6.049
0.67741935483871	6.523		6.5	6.418	6.29	6.212	5.773	
0.709677419354839			6.267	6.245	6.167	6.043	5.991	5.638
0.741935483870968			5.845	5.826	5.759	5.638	5.563	5.249
0.774193548387097			5.272	5.25	5.17	5.046	4.976	4.695
0.806451612903226			4.761	4.74	4.664	4.576	4.552	4.229
0.838709677419355			4.074	4.054	3.977	3.86	3.797	3.508
0.870967741935484			3.451	3.431	3.363	3.278	3.284	3
0.903225806451613			2.775	2.755	2.68	2.567	2.516	2.31
0.935483870967742			1.954	1.935	1.863	1.765	1.746	1.554
0.967741935483871			1.188	1.169	1.098	0.9906	0.9413	0.731

0.1	9.2921	9.2698	9.1822	9.0491	8.9654	8.5094

Average of yearly averages: 6.3688

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: Flturf
Metfile: w12834.dvf
PRZM scenario: FLturfSTD.txt
EXAMS environment file: pond298.exv
Chemical Name: methoxyfenozide

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	368	g/mol	
Henry's Law Const.	henry		atm-m^3/mol	
Vapor Pressure	vapr	2e-8	torr	
Solubility	sol	33	mg/L	
Kd	Kd		mg/L	
Koc	Koc	490	mg/L	
Photolysis half-life	kdp	0	days	Half-life
Aerobic Aquatic Metabolism	kbacw	1559	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	1962	days	Halfife
Aerobic Soil Metabolism	asm	960	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method: CAM	2	integer	See PRZM manual	
Incorporation Depth:	DEPI		cm	
Application Rate:	TAPP	0.13	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	15-2	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	7	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Interval 2	interval	7	days	Set to 0 or delete line for single app.
app. rate 2	apprate		kg/ha	
Interval 3	interval	7	days	Set to 0 or delete line for single app.
app. rate 3	apprate		kg/ha	

Record 17: FILTRA
IPSCND 1
UPTKF
Record 18: PLVKRT
PLDKRT
FEXTRC 0.5
Flag for Index Res. Run IR EPA Pond
Flag for runoff calc. RUNOFF none none, monthly or total(average of entire run)

stored as GAonion.out
Chemical: methoxyfenozide
PRZM environment: GAOnion_WirrigSTD.txt modified Tueday, 29 May 2007 at 12:54:42
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w03822.dvf modified Wedday, 3 July 2002 at 09:04:32
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	4.749	4.69	4.274	3.236	2.533	0.6302
1962	7.865	7.821	7.696	7.457	6.957	5.686
1963	12.19	12.12	11.93	11.71	11.05	8.666
1964	28.64	28.39	27.47	22.67	20.5	14.42
1965	27.07	26.99	26.33	25.36	24.62	23.48
1966	27.41	27.36	27.2	26.94	26.8	25.9
1967	32.65	32.55	32.37	31.71	31.29	29.71
1968	36.68	36.54	36.04	34.26	32.54	30.08
1969	46.09	45.82	45.26	44.87	41.16	35.39
1970	44.99	44.88	44.52	44	43.67	41.79

1971	49.35	49.2	48.78	47.64	45.93	42.41
1972	53.56	53.38	52.75	49.42	47.74	46.43
1973	51.86	51.78	51.43	50.99	50.69	48.64
1974	49.82	49.75	49.5	49.18	48.99	47.24
1975	47.92	47.87	47.74	47.54	47.4	45.83
1976	52.71	52.54	52.16	49.79	48.2	45.71
1977	52.89	52.79	52.55	50.68	50.25	48.61
1978	54.46	54.34	52.37	52.18	51.91	50.01
1979	55.62	55.49	55	53.66	53.34	51.41
1980	54.26	54.18	53.89	53.52	53.29	51.36
1981	51.5	51.46	51.36	51.27	51.13	49.36
1982	51.69	51.62	51.48	51.14	50.88	48.97
1983	52.74	52.59	52.31	51.8	51.61	49.99
1984	53.64	53.56	53.29	52.84	52.64	51.01
1985	54.24	54.09	53.66	52.43	50.97	49.74
1986	55.73	55.61	55.42	53.66	52.64	51.11
1987	56.55	56.44	56.1	55.51	55.13	52.79
1988	53.08	53.04	52.9	52.67	52.64	51.06
1989	57.05	56.89	56.6	52.8	51.59	49.32
1990	64.38	64.16	63.65	62.85	61.74	55.51

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			64.38	64.16	63.65	62.85	61.74	55.51
0.0645161290322581			57.05	56.89	56.6	55.51	55.13	52.79
0.0967741935483871			56.55	56.44	56.1	53.66	53.34	51.41
0.129032258064516			55.73	55.61	55.42	53.66	53.29	51.36
0.161290322580645			55.62	55.49	55	53.52	52.64	51.11
0.193548387096774			54.46	54.34	53.89	52.84	52.64	51.06
0.225806451612903			54.26	54.18	53.66	52.8	52.64	51.01
0.258064516129032			54.24	54.09	53.29	52.67	51.91	50.01
0.290322580645161			53.64	53.56	52.9	52.43	51.61	49.99
0.32258064516129	53.56		53.38	52.75	52.18	51.59	49.74	
0.354838709677419			53.08	53.04	52.55	51.8	51.13	49.36
0.387096774193548			52.89	52.79	52.37	51.27	50.97	49.32
0.419354838709677			52.74	52.59	52.31	51.14	50.88	48.97
0.451612903225806			52.71	52.54	52.16	50.99	50.69	48.64
0.483870967741936			51.86	51.78	51.48	50.68	50.25	48.61
0.516129032258065			51.69	51.62	51.43	49.79	48.99	47.24
0.548387096774194			51.5	51.46	51.36	49.42	48.2	46.43
0.580645161290323			49.82	49.75	49.5	49.18	47.74	45.83
0.612903225806452			49.35	49.2	48.78	47.64	47.4	45.71
0.645161290322581			47.92	47.87	47.74	47.54	45.93	42.41
0.67741935483871	46.09		45.82	45.26	44.87	43.67	41.79	
0.709677419354839			44.99	44.88	44.52	44	41.16	35.39
0.741935483870968			36.68	36.54	36.04	34.26	32.54	30.08
0.774193548387097			32.65	32.55	32.37	31.71	31.29	29.71
0.806451612903226			28.64	28.39	27.47	26.94	26.8	25.9
0.838709677419355			27.41	27.36	27.2	25.36	24.62	23.48
0.870967741935484			27.07	26.99	26.33	22.67	20.5	14.42
0.903225806451613			12.19	12.12	11.93	11.71	11.05	8.666
0.935483870967742			7.865	7.821	7.696	7.457	6.957	5.686
0.967741935483871			4.749	4.69	4.274	3.236	2.533	0.6302

0.1	56.468	56.357	56.032	53.66	53.335	51.405

Average of yearly averages: 40.0754066666667

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: GAonion
Metfile: w03822.dvf
PRZM scenario: GAOnion_WirrigSTD.txt

EXAMS environment file: pond298.exv
Chemical Name: methoxyfenozide

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	368	g/mol	
Henry's Law Const.	henry		atm-m^3/mol	
Vapor Pressure	vapr	2e-8	torr	
Solubility	sol	33	mg/L	
Kd	Kd		mg/L	
Koc	Koc	490	mg/L	
Photolysis half-life	kdp	0	days	Half-life
Aerobic Aquatic Metabolism	kbacw	1559	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	1962	days	Halfife
Aerobic Soil Metabolism	asm	960	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method: CAM	2	integer	See PRZM manual	
Incorporation Depth:	DEPI		cm	
Application Rate:	TAPP	0.21	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	29-9	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	10	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha	
Interval 2	interval	10	days	Set to 0 or delete line for single app.
app. rate 2	apprate		kg/ha	
Interval 3	interval	10	days	Set to 0 or delete line for single app.
app. rate 3	apprate		kg/ha	
Interval 4	interval	10	days	Set to 0 or delete line for single app.
app. rate 4	apprate		kg/ha	
Interval 5	interval	10	days	Set to 0 or delete line for single app.
app. rate 5	apprate		kg/ha	
Record 17:	FILTRA			
IPSCND	1			
UPTKF				
Record 18:	PLVKRT			
PLDKRT				
FEXTRC	0.5			
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

stored as GApeach.out
Chemical: methoxyfenozide
PRZM environment: GAPeachesSTD.txt modified Tueday, 29 May 2007 at 12:54:56
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w03813.dvf modified Wedday, 3 July 2002 at 09:04:32
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	4.339	4.266	4.002	3.672	3.477	2.524
1962	4.826	4.787	4.677	4.464	4.346	3.766
1963	5.621	5.586	5.456	5.249	5.149	4.617
1964	8.037	7.976	7.751	7.408	7.231	6.339
1965	9.553	9.495	9.286	8.997	8.823	7.907
1966	15.3	15.21	14.75	13.99	13.61	11.77
1967	13.42	13.38	13.24	13	12.88	12.16
1968	13.6	13.56	13.42	13.19	13.07	12.31
1969	13.83	13.79	13.66	13.45	13.32	12.52
1970	14.76	14.73	14.58	14.28	14.14	13.19
1971	14.55	14.51	14.4	14.17	14.04	13.21
1972	14.49	14.45	14.31	14.07	13.95	13.15
1973	14.43	14.39	14.25	14.01	13.89	13.08
1974	14.33	14.29	14.15	13.91	13.79	13
1975	17.64	17.55	17.32	16.96	16.7	15.13
1976	16.46	16.42	16.35	16.16	16.02	15.17

1977	16.75	16.71	16.6	16.34	16.18	15.2
1978	16.38	16.35	16.21	15.97	15.83	14.95
1979	18.83	18.74	18.45	18.06	17.8	16.32
1980	17.63	17.59	17.51	17.31	17.16	16.18
1981	18.77	18.71	18.48	18.17	17.97	16.71
1982	19.24	19.18	18.95	18.64	18.46	17.24
1983	24.14	24.01	23.75	23.11	22.67	20.29
1984	23.06	22.99	22.73	22.33	22.08	20.68
1985	21.57	21.53	21.37	21.11	20.96	19.91
1986	20.74	20.7	20.59	20.43	20.29	19.21
1987	20.87	20.82	20.62	20.29	20.09	18.93
1988	20.03	19.99	19.84	19.58	19.44	18.44
1989	24.64	24.51	24.04	23.34	22.97	20.87
1990	22.43	22.38	22.26	22.09	21.93	20.72

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			24.64	24.51	24.04	23.34	22.97	20.87
0.0645161290322581			24.14	24.01	23.75	23.11	22.67	20.72
0.0967741935483871			23.06	22.99	22.73	22.33	22.08	20.68
0.129032258064516			22.43	22.38	22.26	22.09	21.93	20.29
0.161290322580645			21.57	21.53	21.37	21.11	20.96	19.91
0.193548387096774			20.87	20.82	20.62	20.43	20.29	19.21
0.225806451612903			20.74	20.7	20.59	20.29	20.09	18.93
0.258064516129032			20.03	19.99	19.84	19.58	19.44	18.44
0.290322580645161			19.24	19.18	18.95	18.64	18.46	17.24
0.32258064516129	18.83		18.74	18.48	18.17	17.97	16.71	
0.354838709677419			18.77	18.71	18.45	18.06	17.8	16.32
0.387096774193548			17.64	17.59	17.51	17.31	17.16	16.18
0.419354838709677			17.63	17.55	17.32	16.96	16.7	15.2
0.451612903225806			16.75	16.71	16.6	16.34	16.18	15.17
0.483870967741936			16.46	16.42	16.35	16.16	16.02	15.13
0.516129032258065			16.38	16.35	16.21	15.97	15.83	14.95
0.548387096774194			15.3	15.21	14.75	14.28	14.14	13.21
0.580645161290323			14.76	14.73	14.58	14.17	14.04	13.19
0.612903225806452			14.55	14.51	14.4	14.07	13.95	13.15
0.645161290322581			14.49	14.45	14.31	14.01	13.89	13.08
0.67741935483871	14.43		14.39	14.25	13.99	13.79	13	
0.709677419354839			14.33	14.29	14.15	13.91	13.61	12.52
0.741935483870968			13.83	13.79	13.66	13.45	13.32	12.31
0.774193548387097			13.6	13.56	13.42	13.19	13.07	12.16
0.806451612903226			13.42	13.38	13.24	13	12.88	11.77
0.838709677419355			9.553	9.495	9.286	8.997	8.823	7.907
0.870967741935484			8.037	7.976	7.751	7.408	7.231	6.339
0.903225806451613			5.621	5.586	5.456	5.249	5.149	4.617
0.935483870967742			4.826	4.787	4.677	4.464	4.346	3.766
0.967741935483871			4.339	4.266	4.002	3.672	3.477	2.524
0.1	22.997	22.929	22.683	22.306	22.065	20.641		

Average of yearly averages: 14.1831

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: GApeach
Metfile: w03813.dvf
PRZM scenario: GAPeachesSTD.txt
EXAMS environment file: pond298.exv
Chemical Name: methoxyfenozide

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	368	g/mol	
Henry's Law Const.	henry		atm-m^3/mol	
Vapor Pressure	vapr	2e-8	torr	

Solubilitysol		33	mg/L			
Kd	Kd		mg/L			
Koc	Koc	490	mg/L			
Photolysis half-life	kdp		0	days	Half-life	
Aerobic Aquatic Metabolism	kbacw		1559	days	Halfife	
Anaerobic Aquatic Metabolism			kbacs	1962	days	Halfife
Aerobic Soil Metabolism		asm	960	days	Halfife	
Hydrolysis:	pH 7	0	days	Half-life		
Method: CAM	2	integer	See PRZM manual			
Incorporation Depth:		DEPI		cm		
Application Rate:	TAPP	0.28	kg/ha			
Application Efficiency:		APPEFF	0.95	fraction		
Spray Drift	DRFT	0.05	fraction of application rate applied to pond			
Application Date	Date	15-2	dd/mm or dd/mmm or dd-mm or dd-mmm			
Interval 1 interval	7	days	Set to 0 or delete line for single app.			
app. rate 1	apprate		kg/ha			
Interval 2 interval	7	days	Set to 0 or delete line for single app.			
app. rate 2	apprate		kg/ha			
Record 17:	FILTRA					
IPSCND	3					
UPTKF						
Record 18:	PLVKRT					
PLDKRT						
FEXTRC	0.5					
Flag for Index Res. Run		IR	EPA Pond			
Flag for runoff calc.		RUNOFF	none	none, monthly or total(average of entire run)		

stored as MIbeans.out
Chemical: methoxyfenozide
PRZM environment: MIbeansSTD.txt modified Tueday, 29 May 2007 at 12:56:44
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w14826.dvf modified Wedday, 3 July 2002 at 09:05:38
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	12.28	12.1	11.51	11.16	10.99	4.416
1962	14.61	14.57	14.47	14.29	14.18	11.97
1963	18.24	18.19	18.02	17.88	17.79	15.83
1964	25.5	25.39	25.13	24.74	24.67	21.26
1965	33.63	33.46	32.87	32.58	32.25	28.03
1966	34.88	34.86	34.76	34.56	34.29	32.87
1967	40.97	40.93	40.66	40.53	40.19	37.06
1968	57.4	57.11	56.01	54.33	53.54	45.84
1969	60.48	60.3	59.8	58.8	58.29	54.85
1970	65.73	65.62	65.33	64.99	64.82	60.56
1971	68.72	68.58	68.26	67.48	67.27	65.39
1972	76.53	76.31	75.95	75.49	75.39	71.13
1973	79.86	79.76	79.49	78.65	78.01	75.34
1974	79.8	79.7	79.49	79.33	79.19	78.87
1975	98.86	98.61	97.75	96.15	95.13	84.73
1976	94.94	94.84	94.45	93.99	93.79	92.07
1977	95.73	95.64	95.43	94.98	94.82	93.76
1978	96.48	96.35	96.01	95.33	95.03	93.93
1979	98.5	98.34	97.75	97.33	96.88	94.99
1980	102	102	102	101	101	97.42
1981	106	106	106	105	105	101
1982	105	105	104	104	104	103
1983	107	107	107	107	106	104
1984	108	108	107	107	107	105
1985	118	118	117	115	115	108
1986	124	123	123	121	121	114
1987	123	122	122	121	121	118
1988	121	121	120	120	120	119

1989	125	125	124	123	123	120
1990	123	123	122	122	122	120

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			125	125	124	123	123	120
0.064516129032258			124	123	123	122	122	120
0.096774193548387			123	123	122	121	121	119
0.129032258064516			123	122	122	121	121	118
0.161290322580645			121	121	120	120	120	114
0.193548387096774			118	118	117	115	115	108
0.225806451612903			108	108	107	107	107	105
0.258064516129032			107	107	107	107	106	104
0.290322580645161			106	106	106	105	105	103
0.32258064516129	105		105	104	104	104	101	
0.354838709677419			102	102	102	101	101	97.42
0.387096774193548			98.86	98.61	97.75	97.33	96.88	94.99
0.419354838709677			98.5	98.34	97.75	96.15	95.13	93.93
0.451612903225806			96.48	96.35	96.01	95.33	95.03	93.76
0.483870967741936			95.73	95.64	95.43	94.98	94.82	92.07
0.516129032258065			94.94	94.84	94.45	93.99	93.79	84.73
0.548387096774194			79.86	79.76	79.49	79.33	79.19	78.87
0.580645161290323			79.8	79.7	79.49	78.65	78.01	75.34
0.612903225806452			76.53	76.31	75.95	75.49	75.39	71.13
0.645161290322581			68.72	68.58	68.26	67.48	67.27	65.39
0.677419354838710	65.73		65.62	65.33	64.99	64.82	60.56	
0.709677419354839			60.48	60.3	59.8	58.8	58.29	54.85
0.741935483870968			57.4	57.11	56.01	54.33	53.54	45.84
0.774193548387097			40.97	40.93	40.66	40.53	40.19	37.06
0.806451612903226			34.88	34.86	34.76	34.56	34.29	32.87
0.838709677419355			33.63	33.46	32.87	32.58	32.25	28.03
0.870967741935484			25.5	25.39	25.13	24.74	24.67	21.26
0.903225806451613			18.24	18.19	18.02	17.88	17.79	15.83
0.935483870967742			14.61	14.57	14.47	14.29	14.18	11.97
0.967741935483871			12.28	12.1	11.51	11.16	10.99	4.416
0.1	123	122.9	122	121	121	118.9		

Average of yearly averages: 75.7438666666667

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: MIbeans
Metfile: w14826.dvf
PRZM scenario: MIbeansSTD.txt
EXAMS environment file: pond298.exv
Chemical Name: methoxyfenozide

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	368	g/mol	
Henry's Law Const.	henry		atm-m^3/mol	
Vapor Pressure	vapr	2e-8	torr	
Solubility	sol	33	mg/L	
Kd	Kd		mg/L	
Koc	Koc	490	mg/L	
Photolysis half-life	kdp	0	days	Half-life
Aerobic Aquatic Metabolism	kbacw	1559	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	1962	days	Halfife
Aerobic Soil Metabolism	asm	960	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method: CAM	2	integer	See PRZM manual	
Incorporation Depth:	DEPI		cm	
Application Rate:	TAPP	0.28	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	

Spray Drift	DRFT	0.05	fraction of application rate applied to pond
Application Date	Date	19-6	dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1 interval	7	days	Set to 0 or delete line for single app.
app. rate 1	apprate		kg/ha
Interval 2 interval	7	days	Set to 0 or delete line for single app.
app. rate 2	apprate		kg/ha
Interval 3 interval	7	days	Set to 0 or delete line for single app.
app. rate 3	apprate		kg/ha
Record 17:	FILTRA		
IPSCND	1		
UPTKF			
Record 18:	PLVKRT		
PLDKRT			
FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond	
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)

stored as NCpeanuts.out
Chemical: methoxyfenozide
PRZM environment: NCpeanutSTD.txt modified Tueday, 29 May 2007 at 12:58:46
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: wl3722.dvf modified Wedday, 3 July 2002 at 09:05:50
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	1.768	1.742	1.654	1.549	1.523	0.8269
1962	4.952	4.902	4.819	4.594	4.488	2.953
1963	5.47	5.445	5.353	5.295	5.245	4.612
1964	6.987	6.956	6.883	6.795	6.776	5.952
1965	14.42	14.28	13.84	13.31	12.93	9.668
1966	14.49	14.43	14.25	14	13.94	12.55
1967	20.91	20.78	20.43	19.92	19.55	16.16
1968	19.79	19.74	19.56	19.3	19.2	18.35
1969	20.72	20.66	20.48	20.23	20.1	19.05
1970	21.76	21.69	21.62	21.38	21.17	19.9
1971	22.01	21.96	21.8	21.58	21.45	20.62
1972	24.41	24.32	24.08	23.99	23.75	21.84
1973	28.05	27.92	27.5	26.88	26.48	24.09
1974	25.33	25.29	25.18	25.03	24.98	24.51
1975	26.49	26.42	26.17	25.71	25.46	24.49
1976	25.3	25.26	25.09	24.81	24.61	24.3
1977	25.49	25.45	25.27	25.01	24.92	24.36
1978	26.94	26.88	26.64	26.43	26.29	25.07
1979	26.77	26.74	26.61	26.33	26.26	25.43
1980	30.37	30.24	29.78	29.01	28.65	26.59
1981	29.22	29.14	28.87	28.5	28.28	27.33
1982	32.56	32.43	31.97	31.26	30.83	28.61
1983	29.89	29.84	29.67	29.32	29.1	28.49
1984	30.55	30.52	30.3	29.96	29.87	28.56
1985	29.91	29.85	29.62	29.53	29.38	28.55
1986	28.55	28.5	28.34	28.33	28.32	27.88
1987	28.51	28.45	28.23	27.87	27.78	27.33
1988	27.67	27.63	27.55	27.32	27.17	26.76
1989	28.32	28.26	28.15	27.84	27.58	26.46
1990	27.33	27.28	27.09	26.81	26.59	25.93

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			32.56	32.43	31.97	31.26	30.83	28.61
0.0645161290322581			30.55	30.52	30.3	29.96	29.87	28.56
0.0967741935483871			30.37	30.24	29.78	29.53	29.38	28.55
0.129032258064516			29.91	29.85	29.67	29.32	29.1	28.49
0.161290322580645			29.89	29.84	29.62	29.01	28.65	27.88

0.193548387096774		29.22	29.14	28.87	28.5	28.32	27.33
0.225806451612903		28.55	28.5	28.34	28.33	28.28	27.33
0.258064516129032		28.51	28.45	28.23	27.87	27.78	26.76
0.290322580645161		28.32	28.26	28.15	27.84	27.58	26.59
0.32258064516129	28.05	27.92	27.55	27.32	27.17	26.46	
0.354838709677419		27.67	27.63	27.5	26.88	26.59	25.93
0.387096774193548		27.33	27.28	27.09	26.81	26.48	25.43
0.419354838709677		26.94	26.88	26.64	26.43	26.29	25.07
0.451612903225806		26.77	26.74	26.61	26.33	26.26	24.51
0.483870967741936		26.49	26.42	26.17	25.71	25.46	24.49
0.516129032258065		25.49	25.45	25.27	25.03	24.98	24.36
0.548387096774194		25.33	25.29	25.18	25.01	24.92	24.3
0.580645161290323		25.3	25.26	25.09	24.81	24.61	24.09
0.612903225806452		24.41	24.32	24.08	23.99	23.75	21.84
0.645161290322581		22.01	21.96	21.8	21.58	21.45	20.62
0.67741935483871	21.76	21.69	21.62	21.38	21.17	19.9	
0.709677419354839		20.91	20.78	20.48	20.23	20.1	19.05
0.741935483870968		20.72	20.66	20.43	19.92	19.55	18.35
0.774193548387097		19.79	19.74	19.56	19.3	19.2	16.16
0.806451612903226		14.49	14.43	14.25	14	13.94	12.55
0.838709677419355		14.42	14.28	13.84	13.31	12.93	9.668
0.870967741935484		6.987	6.956	6.883	6.795	6.776	5.952
0.903225806451613		5.47	5.445	5.353	5.295	5.245	4.612
0.935483870967742		4.952	4.902	4.819	4.594	4.488	2.953
0.967741935483871		1.768	1.742	1.654	1.549	1.523	0.8269

0.1	30.324	30.201	29.769	29.509	29.352	28.544	
					Average of yearly averages:		20.9073966666667

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: NCpeanuts
Metfile: w13722.dvf
PRZM scenario: NCpeanutSTD.txt
EXAMS environment file: pond298.exv
Chemical Name: methoxyfenozide

Description	Variable	Name	Value	Units	Comments
Molecular weight	mwt	368	g/mol		
Henry's Law Const.	henry		atm-m^3/mol		
Vapor Pressure	vapr	2e-8	torr		
Solubility	sol	33	mg/L		
Kd	Kd		mg/L		
Koc	Koc	490	mg/L		
Photolysis half-life	kdp	0	days	Half-life	
Aerobic Aquatic Metabolism	kbacw	1559	days	Halfife	
Anaerobic Aquatic Metabolism		kbacs	1962	days	Halfife
Aerobic Soil Metabolism	asm	960	days	Halfife	
Hydrolysis:	pH 7	0	days	Half-life	
Method: CAM	2	integer	See PRZM manual		
Incorporation Depth:		DEPI	cm		
Application Rate:	TAPP	0.18	kg/ha		
Application Efficiency:		APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond		
Application Date	Date	24-5	dd/mm or dd/mmm or dd-mm or dd-mmm		
Interval 1	interval	7	days	Set to 0 or delete line for single app.	
app. rate 1	apprate		kg/ha		
Interval 2	interval	7	days	Set to 0 or delete line for single app.	
app. rate 2	apprate		kg/ha		
Record 17:	FILTRA				
	IPSCND	1			
	UPTKF				
Record 18:	PLVKRT				

PLDKRT
FEXTRC 0.5
Flag for Index Res. Run IR EPA Pond
Flag for runoff calc. RUNOFF none none, monthly or total(average of entire run)

stored as NCsweetpotato.out
Chemical: methoxyfenozide
PRZM environment: NCSweetPotatoSTD.txt modified Tueday, 29 May 2007 at 12:58:56
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w13722.dvf modified Wedday, 3 July 2002 at 09:05:50
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	2.374	2.356	2.301	2.192	2.145	1.117
1962	7.844	7.764	7.55	7.224	6.997	4.456
1963	7.666	7.651	7.595	7.5	7.395	6.762
1964	10.46	10.43	10.32	10.24	10.15	8.69
1965	18.95	18.9	18.5	17.87	17.59	13.7
1966	20.01	19.94	19.72	19.44	19.29	17.55
1967	25.81	25.68	25.22	24.61	24.39	21.27
1968	25.98	25.91	25.62	25.22	25.01	23.7
1969	26.58	26.52	26.36	26.01	25.82	24.73
1970	28.69	28.61	28.42	28.26	28.02	26.11
1971	29.28	29.21	28.93	28.66	28.48	27.25
1972	31.52	31.46	31.18	30.94	30.74	28.66
1973	37.17	37	36.41	35.64	35.16	31.71
1974	33.85	33.79	33.57	33.29	33.21	32.69
1975	36.19	36.09	35.71	35.02	34.67	33.05
1976	34.41	34.34	34.1	33.88	33.74	33.07
1977	35.27	35.2	34.94	34.58	34.39	33.36
1978	36.94	36.84	36.49	35.99	35.75	34.3
1979	36.84	36.78	36.53	36.22	36.11	34.86
1980	39.07	38.95	38.54	37.81	37.54	35.8
1981	39.43	39.32	38.9	38.46	38.2	36.59
1982	38.93	38.85	38.53	38.19	37.98	36.85
1983	36.72	36.67	36.47	36.23	36.16	35.73
1984	40.25	40.18	39.88	39.28	38.99	36.76
1985	39.06	39	38.72	38.51	38.32	37.32
1986	37.89	37.83	37.65	37.47	37.35	36.67
1987	37.28	37.21	37.13	36.79	36.58	36.03
1988	36.25	36.2	36.08	35.83	35.74	35.5
1989	36.57	36.51	36.38	36.19	36.06	35.11
1990	34.63	34.62	34.57	34.47	34.39	33.91

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			40.25	40.18	39.88	39.28	38.99	37.32
0.0645161290322581			39.43	39.32	38.9	38.51	38.32	36.85
0.0967741935483871			39.07	39	38.72	38.46	38.2	36.76
0.129032258064516			39.06	38.95	38.54	38.19	37.98	36.67
0.161290322580645			38.93	38.85	38.53	37.81	37.54	36.59
0.193548387096774			37.89	37.83	37.65	37.47	37.35	36.03
0.225806451612903			37.28	37.21	37.13	36.79	36.58	35.8
0.258064516129032			37.17	37	36.53	36.23	36.16	35.73
0.290322580645161			36.94	36.84	36.49	36.22	36.11	35.5
0.322580645161291	36.84		36.78	36.47	36.19	36.06	35.11	
0.354838709677419			36.72	36.67	36.41	35.99	35.75	34.86
0.387096774193548			36.57	36.51	36.38	35.83	35.74	34.3
0.419354838709677			36.25	36.2	36.08	35.64	35.16	33.91
0.451612903225806			36.19	36.09	35.71	35.02	34.67	33.36
0.483870967741936			35.27	35.2	34.94	34.58	34.39	33.07
0.516129032258065			34.63	34.62	34.57	34.47	34.39	33.05
0.548387096774194			34.41	34.34	34.1	33.88	33.74	32.69

0.580645161290323		33.85	33.79	33.57	33.29	33.21	31.71
0.612903225806452		31.52	31.46	31.18	30.94	30.74	28.66
0.645161290322581		29.28	29.21	28.93	28.66	28.48	27.25
0.67741935483871	28.69	28.61	28.42	28.26	28.02	26.11	
0.709677419354839		26.58	26.52	26.36	26.01	25.82	24.73
0.741935483870968		25.98	25.91	25.62	25.22	25.01	23.7
0.774193548387097		25.81	25.68	25.22	24.61	24.39	21.27
0.806451612903226		20.01	19.94	19.72	19.44	19.29	17.55
0.838709677419355		18.95	18.9	18.5	17.87	17.59	13.7
0.870967741935484		10.46	10.43	10.32	10.24	10.15	8.69
0.903225806451613		7.844	7.764	7.595	7.5	7.395	6.762
0.935483870967742		7.666	7.651	7.55	7.224	6.997	4.456
0.967741935483871		2.374	2.356	2.301	2.192	2.145	1.117

0.1	39.069	38.995	38.702	38.433	38.178	36.751	

Average of yearly averages: 27.7768333333333

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: NCsweetpotato
Metfile: w13722.dvf
PRZM scenario: NCSweetPotatoSTD.txt
EXAMS environment file: pond298.exv
Chemical Name: methoxyfenozide

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	368	g/mol	
Henry's Law Const.	henry		atm-m^3/mol	
Vapor Pressure	vapr	2e-8	torr	
Solubility	sol	33	mg/L	
Kd	Kd		mg/L	
Koc	Koc	490	mg/L	
Photolysis half-life	kdp	0	days	Half-life
Aerobic Aquatic Metabolism	kbacw	1559	days	Halfife
Anaerobic Aquatic Metabolism		kbacs	1962	days Halfife
Aerobic Soil Metabolism	asm	960	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method: CAM	2	integer	See PRZM manual	
Incorporation Depth:		DEPI	cm	
Application Rate:	TAPP	0.18	kg/ha	
Application Efficiency:		APPEFF	0.95	fraction
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	29-5	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1 interval	14	days	Set to 0 or delete line for single app.	
app. rate 1	apprate		kg/ha	
Interval 2 interval	14	days	Set to 0 or delete line for single app.	
app. rate 2	apprate		kg/ha	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run		IR	EPA Pond	
Flag for runoff calc.		RUNOFF	none	none, monthly or total(average of entire run)

stored as PAalfalfa.out
Chemical: methoxyfenozide
PRZM environment: PAalfalfaOP.txt modified Thuday, 14 June 2007 at 10:23:40
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w14751.dvf modified Wedday, 3 July 2002 at 09:06:14
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	3.344	3.321	3.208	3.11	3.049	1.526
1962	4.287	4.261	4.172	4.107	4.094	3.523
1963	5.131	5.127	5.115	5.085	5.037	4.623
1964	7.126	7.098	6.991	6.898	6.856	6.109
1965	7.873	7.849	7.763	7.712	7.712	7.259
1966	11.87	11.79	11.55	11.24	11.1	8.761
1967	13.03	12.99	12.89	12.67	12.58	11.64
1968	16.36	16.28	16.02	15.52	15.25	13.74
1969	19.55	19.44	19.07	18.5	18.21	15.97
1970	19.03	18.99	18.86	18.69	18.55	17.75
1971	19.65	19.61	19.43	19.24	19.1	18.36
1972	29.48	29.27	28.5	27.21	26.57	22.26
1973	27.27	27.2	26.91	26.43	26.15	24.97
1974	26.28	26.24	26.07	25.93	25.91	25.34
1975	27.54	27.48	27.28	26.95	26.78	25.85
1976	27.64	27.59	27.37	27.08	26.96	26.1
1977	26.5	26.47	26.34	26.21	26.1	25.63
1978	27.7	27.64	27.47	27.11	27.05	25.93
1979	27.32	27.28	27.15	26.99	26.87	26.12
1980	28.31	28.25	28	27.55	27.29	26.27
1981	26.85	26.82	26.69	26.65	26.64	26.17
1982	32.05	31.92	31.81	31.18	30.76	28.1
1983	30.92	30.86	30.64	30.21	29.93	28.94
1984	32.24	32.16	32.03	31.75	31.47	29.73
1985	31.78	31.72	31.66	31.37	31.14	30.14
1986	31.15	31.11	30.96	30.71	30.55	30.02
1987	31.71	31.65	31.41	30.97	30.84	30.14
1988	31.15	31.12	30.98	30.66	30.59	29.97
1989	32.36	32.31	32.1	31.98	31.89	30.54
1990	34.13	34.04	33.68	33.18	32.92	31.43

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			34.13	34.04	33.68	33.18	32.92	31.43
0.0645161290322581			32.36	32.31	32.1	31.98	31.89	30.54
0.0967741935483871			32.24	32.16	32.03	31.75	31.47	30.14
0.129032258064516			32.05	31.92	31.81	31.37	31.14	30.14
0.161290322580645			31.78	31.72	31.66	31.18	30.84	30.02
0.193548387096774			31.71	31.65	31.41	30.97	30.76	29.97
0.225806451612903			31.15	31.12	30.98	30.71	30.59	29.73
0.258064516129032			31.15	31.11	30.96	30.66	30.55	28.94
0.290322580645161			30.92	30.86	30.64	30.21	29.93	28.1
0.32258064516129	29.48		29.27	28.5	27.55	27.29	26.27	
0.354838709677419			28.31	28.25	28	27.21	27.05	26.17
0.387096774193548			27.7	27.64	27.47	27.11	26.96	26.12
0.419354838709677			27.64	27.59	27.37	27.08	26.87	26.1
0.451612903225806			27.54	27.48	27.28	26.99	26.78	25.93
0.483870967741936			27.32	27.28	27.15	26.95	26.64	25.85
0.516129032258065			27.27	27.2	26.91	26.65	26.57	25.63
0.548387096774194			26.85	26.82	26.69	26.43	26.15	25.34
0.580645161290323			26.5	26.47	26.34	26.21	26.1	24.97
0.612903225806452			26.28	26.24	26.07	25.93	25.91	22.26
0.645161290322581			19.65	19.61	19.43	19.24	19.1	18.36
0.67741935483871	19.55		19.44	19.07	18.69	18.55	17.75	
0.709677419354839			19.03	18.99	18.86	18.5	18.21	15.97
0.741935483870968			16.36	16.28	16.02	15.52	15.25	13.74
0.774193548387097			13.03	12.99	12.89	12.67	12.58	11.64
0.806451612903226			11.87	11.79	11.55	11.24	11.1	8.761
0.838709677419355			7.873	7.849	7.763	7.712	7.712	7.259
0.870967741935484			7.126	7.098	6.991	6.898	6.856	6.109
0.903225806451613			5.131	5.127	5.115	5.085	5.037	4.623
0.935483870967742			4.287	4.261	4.172	4.107	4.094	3.523

0.967741935483871			3.344	3.321	3.208	3.11	3.049	1.526
0.1	32.221	32.136	32.008	31.712	31.437	30.14		
					Average of yearly averages:			21.0970333333333

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: PAalfalfa
Metfile: w14751.dvf
PRZM scenario: PAalfalfaOP.txt
EXAMS environment file: pond298.exv
Chemical Name: methoxyfenozide

Description	Variable	Name	Value	Units	Comments	
Molecular weight	mwt	368	g/mol			
Henry's Law Const.	henry		atm-m^3/mol			
Vapor Pressure	vapr	2e-8	torr			
Solubility	sol	33	mg/L			
Kd	Kd		mg/L			
Koc	Koc	490	mg/L			
Photolysis half-life	kdp	0	days	Half-life		
Aerobic Aquatic Metabolism	kbacw	1559	days	Halfife		
Anaerobic Aquatic Metabolism		kbacs	1962	days	Halfife	
Aerobic Soil Metabolism	asm	960	days	Halfife		
Hydrolysis:	pH 7	0	days	Half-life		
Method: CAM	2	integer	See PRZM manual			
Incorporation Depth:		DEPI		cm		
Application Rate:	TAPP	0.13	kg/ha			
Application Efficiency:		APPEFF	0.95	fraction		
Spray Drift	DRFT	0.05	fraction of application rate applied to pond			
Application Date	Date	30-4	dd/mm or dd/mmm or dd-mm or dd-mmm			
Interval 1 interval	7	days	Set to 0 or delete line for single app.			
app. rate 1	apprate		kg/ha			
Interval 2 interval	7	days	Set to 0 or delete line for single app.			
app. rate 2	apprate		kg/ha			
Interval 3 interval	7	days	Set to 0 or delete line for single app.			
app. rate 3	apprate		kg/ha			
Record 17:	FILTRA					
IPSCND	1					
UPTKF						
Record 18:	PLVKRT					
PLDKRT						
FEXTRC	0.5					
Flag for Index Res. Run		IR	EPA Pond			
Flag for runoff calc.		RUNOFF	none	none, monthly or total(average of entire run)		

APPENDIX B: Summary of the Available Toxicity Data for Methoxyfenozide.

TABLE B.1. Summary of Submitted Toxicity Data for Methoxyfenozide and Aquatic Animals.

SPECIES	ENDPOINT (mg a.i./L)	COMMENT(S)	MRID	STUDY CLASSIFICATION
FRESHWATER FISH				
Rainbow trout *Oncorhychus mykiss*	96-hr LC_{50} = > 4.2	Moderately toxic	441444-10	Acceptable
Bluegill sunfish *Lepomis macrochirus*	96-hr LC_{50} = > 4.2	Moderately toxic	441444-09	Acceptable
Fathead minnow *Pimephales promelus*	NOAEC = 0.53 LOAEC = 1.0	Based on survival	446177-16	Acceptable
FRESHWATER INVERTEBRATE				
Midge *Chironomus riparus*	96-hr EC_{50} = 0.05[1]	Highly toxic	Based on an acute to chronic ratio	--
Waterflea *Daphnia magna*	48-hr EC_{50} = 3.7	Moderately toxic	441444-11	Acceptable
Midge *Chironomus riparus*	NOAEC = 0.0026 LOAEC = 0.013	Based on delayed emergence and development	450328-01	Supplemental (Non-guideline)
Waterflea *Daphnia magna*	NOAEC = 0.20 LOAEC = 0.39	Based on survival	446177-14	Acceptable
ESTUARINE/MARINE FISH				
Sheepshead minnow *Cyprinodon variegatus*	96-hr LC_{50} = > 2.8	Moderately toxic	441444-12	Acceptable
Sheepshead minnow *Cyprinodon variegatus*	NOAEC = 1.5 LOAEC = 2.6	Based on growth	446177-12	Acceptable
ESTUARINE/MARINE INVERTEBRATE				
Eastern oyster *Crassostrea virginica*	96-hr EC_{50} = 1.2	Moderately toxic	441444-13	Acceptable
Mysid shrimp *Mysidopsis bahia*	96-hr EC_{50} = 1.3	Moderately toxic	441444-14	Acceptable
Eastern oyster *Crassostrea virginica*	NOAEC = 0.023[2]	Based on growth	Based on an acute to chronic ratio	--
Mysid shrimp *Mysidopsis bahia*	NOAEC = 0.025 LOAEC = 0.051	Based on growth	446177-15	Acceptable
NON-VASCULAR AQUATIC PLANTS				

SPECIES	ENDPOINT (mg a.i./L)	COMMENT(S)	MRID	STUDY CLASSIFICATION
Freshwater alga *Selenastrum capricornutum*	120-hr EC_{50} = >3.4 mg/L	No effects at the highest treatment level tested	446177-18	Acceptable

[1] This endpoint is based on an acute to chronic ratio using acute and chronic data from daphnids and chronic data from midges.

[2] This endpoint is based on an acute to chronic ratio using acute and chronic data from mysids and acute data from the Eastern oyster.

TABLE B.2. Summary of Available Toxicity Data for Methoxyfenozide and Terrestrial Animals.

SPECIES	ENDPOINT	COMMENT(S)	MRID	STUDY CLASSIFICATION
BIRDS				
Northern bobwhite quail *Colinus virginianus*	LD_{50} = > 2,250 mg a.i./kg-diet	Practically nontoxic	441444-06	Acceptable
Mallard duck *Anas platyrhynchos*	LC_{50} = > 2,250 mg a.i./kg-diet	Practically nontoxic	441444-08	Acceptable
Northern bobwhite quail *Colinus virginianus*	NOAEC = 520 mg a.i./kg-diet LOAEC = 780 mg a.i./kg-diet	Based on egg-shell thinning	446177-11	Acceptable
Mallard duck *Anas platyrhynchos*	NOAEC = 780 mg a.i./kg-diet LOAEC = 1,000 mg a.i./kg-diet	Based on hatchling weight	446177-10	Acceptable
MAMMAL				
Laboratory rat *Rattus norvegicus*	LD_{50} = > 5,000 mg a.i./kg-diet	Practically nontoxic	441444-15	Acceptable
Laboratory rat *Rattus norvegicus*	NOAEL = >1,552 mg a.i./kg-diet	No adverse effects on reproduction	446177-31	Acceptable
TERRESTRIAL INVERTEBRATE				
Honey bee *Apis meliferus*	LD_{50} = > 100 µg/bee (Acute contact)	Practically nontoxic	441444-29	Acceptable
Honey bee *Apis meliferus*	LD_{50} = > 100 µg/bee (Subacute oral)	Practically nontoxic	446177-17	Supplemental
Honey bee *Apis meliferus*	No statistical difference when bees fed syrup with 101.12 mg a.i./L concentration (only one exposure)	No classification (3-week study)	45065501	Supplemental
European corn borer *Ostrinia nubilalis*	96-hr LC_{50} = 0.036 mg/kg-diet	Highly toxic	Trisyono and Chippendale 1997/ECOTOX: 64128	Supplemental

APPENDIX C: T-REX RUNS FOR METHOXYFENOZIDE (Avocado and Grass/Non-Grass Forage Uses):

1. AVOCADO USE:

Chemical Name:	Methoxyfenozide
Use	Avocado
Formulation	0
Application Rate	0.25 lbs a.i./acre
Half-life	35 days
Application Interval	6 days
Maximum # Apps./Year	4
Length of Simulation	1 year

Endpoints

Avian	**Bobwhite quail**	LD50 (mg/kg-bw)	2250.00
	Mallard duck)	LC50 (mg/kg-diet)	2250.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Bobwhite quail	NOAEC (mg/kg-diet)	520.00
Mammals		LD50 (mg/kg-bw)	5000.00
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	10.00
		NOAEC (mg/kg-diet)	200.00

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	202.59
Tall Grass	92.86
Broadleaf plants/sm Insects	113.96
Fruits/pods/seeds/lg insects	12.66

Summary of Risk Quotient Calculations Based on Upper Bound Kenega EECs

Table 1.a. Upper 90th Percentile Kenaga, Acute Avian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs							
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
20	1620.97	230.74	0.14	105.75	0.07	129.79	0.08	14.42	0.01
100	2063.57	131.58	0.06	60.31	0.03	74.01	0.04	8.22	0.00
1000	2914.87	58.91	0.02	27.00	0.01	33.14	0.01	3.68	0.00

Table 1.b. Upper 90th Percentile Kenega, Subacute Avian Dietary Based Risk Quotients

	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
LC50	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
2250	202.59	0.09	92.86	0.04	113.96	0.05	12.66	0.01

Size class not used for dietary risk quotients

Table 1.c. Upper 90th Percentile Kenega, Chronic Avian Dietary Based Risk Quotients

	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
NOAEC (ppm)	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
520	202.59	0.39	92.86	0.18	113.96	0.22	12.66	0.02

Size class not used for dietary risk quotients

Table 1.d. Upper 90th Percentile Kenaga, Acute Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	10989.15	193.16	0.02	88.53	0.01	108.65	0.01	12.07	0.00	2.68	0.00
35	8891.40	133.50	0.02	61.19	0.01	75.09	0.01	8.34	0.00	1.85	0.00
1000	3845.80	30.95	0.01	14.19	0.00	17.41	0.00	1.93	0.00	0.43	0.00

Table 1.e. Upper 90th Percentile Kenega, Chronic Mammalian Dietary Based Risk Quotients

	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
NOAEC (ppm)	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
200	202.59	1.01	92.86	0.46	113.96	0.57	12.66	0.06

Size class not used for dietary risk quotients

Table 1.f. Upper 90th Percentile Kenega, Chronic Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	21.98	193.16	8.79	88.53	4.03	108.65	4.94	12.07	0.55	2.68	0.12
35	17.78	133.50	7.51	61.19	3.44	75.09	4.22	8.34	0.47	1.85	0.10
1000	7.69	30.95	4.02	14.19	1.84	17.41	2.26	1.93	0.25	0.43	0.06

Summary of Risk Quotient Calculations Based on Mean Kenega EECs

Table 1.g. Mean Kenaga, Acute Avian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs							
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
20	1620.97	81.80	0.050	34.64	0.021	43.30	0.027	6.74	0.004
100	2063.57	46.64	0.023	19.75	0.010	24.69	0.012	3.84	0.002
1000	2914.87	20.81	0.007	8.81	0.003	11.02	0.004	1.71	0.001

Table 1.h. Mean Kenega, Subacute Avian Dietary Based Risk Quotients

	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
LC50	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
2250	71.75	0.032	30.39	0.014	37.99	0.017	5.91	0.003

Size class not used for dietary risk quotients

Table 1.i. Mean Kenega, Chronic Avian Dietary Based Risk Quotients

	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
NOAEC (ppm)	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
520	71.75	0.138	30.39	0.058	37.99	0.073	5.91	0.011

Size class not used for dietary risk quotients

Table 1.j. Mean Kenaga, Acute Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	10989.15	68.16	0.006	28.87	0.003	36.09	0.003	5.61	0.001	1.24	0.00
35	8891.40	47.36	0.005	20.06	0.002	25.07	0.003	3.90	0.000	0.89	0.00
1000	3845.80	10.76	0.003	4.56	0.001	5.70	0.001	0.89	0.000	0.18	0.00

Table 1.k. Mean Kenega, Chronic Mammalian Dietary Based Risk Quotients

NOAEC (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
200	71.75	0.359	30.39	0.152	37.99	0.190	5.91	0.030

Size class not used for dietary risk quotients

Table 1.l. Mean Kenega, Chronic Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	21.98	68.16	3.101	28.87	1.314	36.09	1.642	5.61	0.255	1.24	0.06
35	17.78	47.36	2.663	20.06	1.128	25.07	1.410	3.90	0.219	0.89	0.05
1000	7.69	10.76	1.399	4.56	0.593	5.70	0.741	0.89	0.115	0.18	0.02

2. GRASS/NON-GRASS FORAGE USE:

Chemical Name:	Methoxyfenozide
Use	Grass/Non-Grass Forage
Formulation	0
Application Rate	0.12 lbs a.i./acre
Half-life	35 days
Application Interval	30 days
Maximum # Apps./Year	4
Length of Simulation	1 year

Endpoints

Avian	**Bobwhite quail**	LD50 (mg/kg-bw)	2250.00
	Mallard duck)	LC50 (mg/kg-diet)	2250.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Bobwhite quail	NOAEC (mg/kg-diet)	520.00
Mammals		LD50 (mg/kg-bw)	5000.00
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	10.00
		NOAEC (mg/kg-diet)	200.00

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	58.32
Tall Grass	26.73
Broadleaf plants/sm Insects	32.81
Fruits/pods/seeds/lg insects	3.65

Summary of Risk Quotient Calculations Based on Upper Bound Kenega EECs

Table 2.a. Upper 90th Percentile Kenaga, Acute Avian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs							
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
20	1620.97	66.42	0.04	30.44	0.02	37.36	0.02	4.15	0.00
100	2063.57	37.88	0.02	17.36	0.01	21.31	0.01	2.37	0.00
1000	2914.87	16.96	0.01	7.77	0.00	9.54	0.00	1.06	0.00

Table 2.b. Upper 90th Percentile Kenega, Subacute Avian Dietary Based Risk Quotients

	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
LC50	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
2250	58.32	0.03	26.73	0.01	32.81	0.01	3.65	0.00

Size class not used for dietary risk quotients

Table 2.c. Upper 90th Percentile Kenega, Chronic Avian Dietary Based Risk Quotients

	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
NOAEC (ppm)	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
520	58.32	0.11	26.73	0.05	32.81	0.06	3.65	0.01

Size class not used for dietary risk quotients

Table 2.d. Upper 90th Percentile Kenaga, Acute Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	10989.15	55.60	0.01	25.49	0.00	31.28	0.00	3.48	0.00	0.77	0.00
35	8891.40	38.43	0.00	17.61	0.00	21.62	0.00	2.40	0.00	0.53	0.00
1000	3845.80	8.91	0.00	4.08	0.00	5.01	0.00	0.56	0.00	0.12	0.00

Table 2.e. Upper 90th Percentile Kenega, Chronic Mammalian Dietary Based Risk Quotients

NOAEC (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
200	58.32	0.29	26.73	0.13	32.81	0.16	3.65	0.02

Size class not used for dietary risk quotients

Table 2.f. Upper 90th Percentile Kenega, Chronic Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	21.98	55.60	2.53	25.49	1.16	31.28	1.42	3.48	0.16	0.77	0.04
35	17.78	38.43	2.16	17.61	0.99	21.62	1.22	2.40	0.14	0.53	0.03
1000	7.69	8.91	1.16	4.08	0.53	5.01	0.65	0.56	0.07	0.12	0.02

Summary of Risk Quotient Calculations Based on Mean Kenega EECs

Table 2.g. Mean Kenaga, Acute Avian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs							
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
20	1620.97	23.55	0.015	9.97	0.006	12.47	0.008	1.94	0.001
100	2063.57	13.43	0.007	5.69	0.003	7.11	0.003	1.11	0.001
1000	2914.87	5.99	0.002	2.54	0.001	3.17	0.001	0.49	0.000

Table 2.h. Mean Kenega, Subacute Avian Dietary Based Risk Quotients

LC50	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
2250	20.66	0.009	8.75	0.004	10.94	0.005	1.70	0.001

Size class not used for dietary risk quotients

Table 2.i. Mean Kenega, Chronic Avian Dietary Based Risk Quotients

NOAEC (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
520	20.66	0.040	8.75	0.017	10.94	0.021	1.70	0.003

Size class not used for dietary risk quotients

Table 2.j. Mean Kenaga, Acute Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	10989.15	19.62	0.002	8.31	0.001	10.39	0.001	1.62	0.000	0.36	0.00
35	8891.40	13.63	0.002	5.77	0.001	7.22	0.001	1.12	0.000	0.26	0.00
1000	3845.80	3.10	0.001	1.31	0.000	1.64	0.000	0.26	0.000	0.05	0.00

Table 2.k. Mean Kenega, Chronic Mammalian Dietary Based Risk Quotients

NOAEC (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
200	20.66	0.103	8.75	0.044	10.94	0.055	1.70	0.009

Size class not used for dietary risk quotients

Table 2.l. Mean Kenega, Chronic Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	21.98	19.62	0.893	8.31	0.378	10.39	0.473	1.62	0.074	0.36	0.02
35	17.78	13.63	0.767	5.77	0.325	7.22	0.406	1.12	0.063	0.26	0.01
1000	7.69	3.10	0.403	1.31	0.171	1.64	0.213	0.26	0.033	0.05	0.01

APPENDIX D: Listed Species that Overlap with Some of the Proposed New Uses of Methoxyfenozide [*i.e.*, blueberries (wild and tame), cranberries, currants, berries (other), dry edible beans, forage, hay and all haylage, grass silage, greenchop, small grain, peanuts, avocados, green onions, ginger root, sweet potatoes, guava, and passion fruit].

INVERSE NAME:	TAXON:	STATUS:
Frog, California Red-legged	Amphibian	Threatened
Frog, Chiricahua Leopard	Amphibian	Threatened
Frog, Dusky Gopher (Mississippi DPS)	Amphibian	Endangered
Frog, Mountain Yellow-legged	Amphibian	Endangered
Salamander, Barton Springs	Amphibian	Endangered
Salamander, California Tiger	Amphibian	Endangered
Salamander, Cheat Mountain	Amphibian	Threatened
Salamander, Desert Slender	Amphibian	Endangered
Salamander, Flatwoods	Amphibian	Threatened
Salamander, Red Hills	Amphibian	Threatened
Salamander, San Marcos	Amphibian	Threatened
Salamander, Santa Cruz Long-toed	Amphibian	Endangered
Salamander, Shenandoah	Amphibian	Endangered
Salamander, Sonora Tiger	Amphibian	Endangered
Salamander, Texas Blind	Amphibian	Endangered
Toad, Arroyo Southwestern	Amphibian	Endangered
Toad, Houston	Amphibian	Endangered
Toad, Wyoming	Amphibian	Endangered
Harvestman, Bee Creek Cave	Arachnid	Endangered
Harvestman, Bone Cave	Arachnid	Endangered
Harvestman, Robber Baron Cave	Arachnid	Endangered
Meshweaver, Braken Bat Cave	Arachnid	Endangered
Pseudoscorpion, Tooth Cave	Arachnid	Endangered
Spider, Government Canyon Cave	Arachnid	Endangered
Spider, Kauai Cave Wolf	Arachnid	Endangered
Spider, Madla's Cave	Arachnid	Endangered
Spider, Robber Baron Cave	Arachnid	Endangered
Spider, Spruce-fir Moss	Arachnid	Endangered
Spider, Tooth Cave	Arachnid	Endangered
Spider, Vesper Cave	Arachnid	Endangered
'Akepa, Hawaii	Bird	Endangered
'Akepa, Maui	Bird	Endangered
'Akia Loa, Kauai (Hemignathus procerus)	Bird	Endangered
'Akia Pola'au (Hemignathus munroi)	Bird	Endangered
Albatross, Short-tailed	Bird	Endangered
Bobwhite, Masked	Bird	Endangered
Caracara, Audubon's Crested	Bird	Threatened
Condor, California	Bird	Endangered
Coot, Hawaiian (=Alae keo keo)	Bird	Endangered
Crane, Mississippi Sandhill	Bird	Endangered
Crane, Whooping	Bird	Endangered
Creeper, Hawaii	Bird	Endangered
Creeper, Molokai (Kakawahie)	Bird	Endangered
Creeper, Oahu (Alauwahio)	Bird	Endangered
Crow, Hawaiian ('Alala)	Bird	Endangered

Curlew, Eskimo	Bird	Endangered
Duck, Hawaiian (Koloa)	Bird	Endangered
Duck, Laysan	Bird	Endangered
Elepaio, Oahu	Bird	Endangered
Falcon, Northern Aplomado	Bird	Endangered
Finch, Laysan	Bird	Endangered
Finch, Nihoa	Bird	Endangered
Flycatcher, Southwestern Willow	Bird	Endangered
Gnatcatcher, Coastal California	Bird	Threatened
Goose, Hawaiian (Nene)	Bird	Endangered
Hawk, Hawaiian (Io)	Bird	Endangered
Honeycreeper, Crested ('Akohekohe)	Bird	Endangered
Kite, Everglade Snail	Bird	Endangered
Millerbird, Nihoa	Bird	Endangered
Moorhen, Hawaiian Common	Bird	Endangered
Murrelet, Marbled	Bird	Threatened
Nuku Pu'u	Bird	Endangered
'O'o, Kauai (='A'a)	Bird	Endangered
'O'u (Honeycreeper)	Bird	Endangered
Owl, Mexican Spotted	Bird	Threatened
Owl, Northern Spotted	Bird	Threatened
Palila	Bird	Endangered
Parrotbill, Maui	Bird	Endangered
Pelican, Brown	Bird	Endangered
Petrel, Hawaiian Dark-rumped	Bird	Endangered
Plover, Piping	Bird	Endangered
Plover, Western Snowy	Bird	Threatened
Po'ouli	Bird	Endangered
Prairie-chicken, Attwater's Greater	Bird	Endangered
Pygmy-owl, Cactus Ferruginous	Bird	Endangered
Rail, California Clapper	Bird	Endangered
Rail, Light-footed Clapper	Bird	Endangered
Rail, Yuma Clapper	Bird	Endangered
Scrub-Jay, Florida	Bird	Threatened
Shearwater, Newell's Townsend's	Bird	Threatened
Shrike, San Clemente Loggerhead	Bird	Endangered
Sparrow, Cape Sable Seaside	Bird	Endangered
Sparrow, Florida Grasshopper	Bird	Endangered
Sparrow, San Clemente Sage	Bird	Threatened
Starling, Ponape Mountain	Bird	Endangered
Stilt, Hawaiian (=Ae'o)	Bird	Endangered
Stork, Wood	Bird	Endangered
Tern, California Least	Bird	Endangered
Tern, Interior (population) Least	Bird	Endangered
Tern, Roseate	Bird	Endangered
Thrush, Large Kauai	Bird	Endangered
Thrush, Molokai (Oloma'o)	Bird	Endangered
Thrush, Small Kauai (Puaiohi)	Bird	Endangered
Towhee, Inyo Brown	Bird	Threatened
Vireo, Black-capped	Bird	Endangered
Vireo, Least Bell's	Bird	Endangered

Warbler (=Wood), Golden-cheeked	Bird	Endangered
Warbler (=Wood), Kirtland's	Bird	Endangered
Warbler, Bachman's	Bird	Endangered
Woodpecker, Ivory-billed	Bird	Endangered
Woodpecker, Red-cockaded	Bird	Endangered
Bankclimber, Purple	Bivalve	Threatened
Combshell, Southern (=Penitent mussel)	Bivalve	Endangered
Combshell, Upland	Bivalve	Endangered
Elktoe, Appalachian	Bivalve	Endangered
Fanshell	Bivalve	Endangered
Fatmucket, Arkansas	Bivalve	Threatened
Kidneyshell, Triangular	Bivalve	Endangered
Mucket, Orangenacre	Bivalve	Threatened
Mucket, Pink (Pearlymussel)	Bivalve	Endangered
Mussel, Acornshell Southern	Bivalve	Endangered
Mussel, Alabama Moccasinshell	Bivalve	Threatened
Mussel, Black (=Curtus' Mussel) Clubshell	Bivalve	Endangered
Mussel, Clubshell	Bivalve	Endangered
Mussel, Coosa Moccasinshell	Bivalve	Endangered
Mussel, Cumberland Combshell	Bivalve	Endangered
Mussel, Cumberland Elktoe	Bivalve	Endangered
Mussel, Cumberland Pigtoe	Bivalve	Endangered
Mussel, Dark Pigtoe	Bivalve	Endangered
Mussel, Dwarf Wedge	Bivalve	Endangered
Mussel, Fine-lined Pocketbook	Bivalve	Threatened
Mussel, Fine-rayed Pigtoe	Bivalve	Endangered
Mussel, Flat Pigtoe (=Marshall's Mussel)	Bivalve	Endangered
Mussel, Gulf Moccasinshell	Bivalve	Endangered
Mussel, Heavy Pigtoe (=Judge Tait's Mussel)	Bivalve	Endangered
Mussel, Heelsplitter Carolina	Bivalve	Endangered
Mussel, Heelsplitter Inflated	Bivalve	Threatened
Mussel, Ochlockonee Moccasinshell	Bivalve	Endangered
Mussel, Oval Pigtoe	Bivalve	Endangered
Mussel, Ovate Clubshell	Bivalve	Endangered
Mussel, Oyster	Bivalve	Endangered
Mussel, Ring Pink (=Golf Stick Pearly)	Bivalve	Endangered
Mussel, Rough Pigtoe	Bivalve	Endangered
Mussel, Scaleshell	Bivalve	Endangered
Mussel, Shiny Pigtoe	Bivalve	Endangered
Mussel, Shiny-rayed Pocketbook	Bivalve	Endangered
Mussel, Southern Clubshell	Bivalve	Endangered
Mussel, Southern Pigtoe	Bivalve	Endangered
Mussel, Speckled Pocketbook	Bivalve	Endangered
Mussel, Winged Mapleleaf	Bivalve	Endangered
Pearlshell, Louisiana	Bivalve	Threatened
Pearlymussel, Alabama Lamp	Bivalve	Endangered
Pearlymussel, Appalachian Monkeyface	Bivalve	Endangered
Pearlymussel, Birdwing	Bivalve	Endangered
Pearlymussel, Cracking	Bivalve	Endangered
Pearlymussel, Cumberland Bean	Bivalve	Endangered
Pearlymussel, Cumberland Monkeyface	Bivalve	Endangered

Pearlymussel, Curtis'	Bivalve	Endangered
Pearlymussel, Dromedary	Bivalve	Endangered
Pearlymussel, Fat Pocketbook	Bivalve	Endangered
Pearlymussel, Green-blossom	Bivalve	Endangered
Pearlymussel, Higgins' Eye	Bivalve	Endangered
Pearlymussel, Little-wing	Bivalve	Endangered
Pearlymussel, Orange-footed	Bivalve	Endangered
Pearlymussel, Pale Lilliput	Bivalve	Endangered
Pearlymussel, Purple Cat's Paw	Bivalve	Endangered
Pearlymussel, Tubercled-blossom	Bivalve	Endangered
Pearlymussel, Turgid-blossom	Bivalve	Endangered
Pearlymussel, White Cat's Paw	Bivalve	Endangered
Pearlymussel, White Wartyback	Bivalve	Endangered
Pearlymussel, Yellow-blossom	Bivalve	Endangered
Purple Bean	Bivalve	Endangered
Rabbitsfoot, Rough	Bivalve	Endangered
Riffleshell, Northern	Bivalve	Endangered
Riffleshell, Tan	Bivalve	Endangered
Rock-pocketbook, Ouachita (=Wheeler's pm)	Bivalve	Endangered
Slabshell, Chipola	Bivalve	Threatened
Spinymussel, James River	Bivalve	Endangered
Spinymussel, Tar River	Bivalve	Endangered
Stirrupshell	Bivalve	Endangered
Threeridge, Fat (Mussel)	Bivalve	Endangered
Cypress, Gowen	Conf/cycds	Threatened
Cypress, Santa Cruz	Conf/cycds	Endangered
Torreya, Florida	Conf/cycds	Endangered
Staghorn coral	Coral	Threatened
Abalone, White	Crustacean	Endangered
Amphipod, Illinois Cave	Crustacean	Endangered
Amphipod, Kauai Cave	Crustacean	Endangered
Amphipod, Noel's	Crustacean	Endangered
Amphipod, Peck's Cave	Crustacean	Endangered
Crayfish, Cave (Cambarus aculabrum)	Crustacean	Endangered
Crayfish, Cave (Cambarus zophonastes)	Crustacean	Endangered
Crayfish, Nashville	Crustacean	Endangered
Crayfish, Shasta	Crustacean	Endangered
Fairy Shrimp, Conservancy Fairy	Crustacean	Endangered
Fairy Shrimp, Longhorn	Crustacean	Endangered
Fairy Shrimp, Riverside	Crustacean	Endangered
Fairy Shrimp, San Diego	Crustacean	Endangered
Fairy Shrimp, Vernal Pool	Crustacean	Threatened
Isopod, Lee County Cave	Crustacean	Endangered
Isopod, Madison Cave	Crustacean	Threatened
Isopod, Socorro	Crustacean	Endangered
Shrimp, Alabama Cave	Crustacean	Endangered
Shrimp, California Freshwater	Crustacean	Endangered
Shrimp, Kentucky Cave	Crustacean	Endangered
Shrimp, Squirrel Chimney Cave	Crustacean	Threatened
Tadpole Shrimp, Vernal Pool	Crustacean	Endangered
Abutilon eremitopetalum (ncn)	Dicot	Endangered

Abutilon sandwicense (ncn)	Dicot	Endangered
Achyranthes mutica (ncn)	Dicot	Endangered
Achyranthes splendens var. rotundata (ncn)	Dicot	Endangered
Adobe Sunburst, San Joaquin	Dicot	Threatened
A'e (Zanthoxylum dipetalum var. tomentosum)	Dicot	Endangered
A'e (Zanthoxylum hawaiiense)	Dicot	Endangered
'Aiea (Nothocestrum breviflorum)	Dicot	Endangered
'Aiea (Nothocestrum peltatum)	Dicot	Endangered
'Akoko (Chamaesyce celastroides var. kaenana)	Dicot	Endangered
'Akoko (Chamaesyce deppeana)	Dicot	Endangered
'Akoko (Chamaesyce herbstii)	Dicot	Endangered
'Akoko (Chamaesyce kuwaleana)	Dicot	Endangered
'Akoko (Chamaesyce rockii)	Dicot	Endangered
'Akoko (Chamaesyce skottsbergii var. skottsbe	Dicot	Endangered
'Akoko (Euphorbia haeleeleana)	Dicot	Endangered
Alani (Melicope adscendens)	Dicot	Endangered
Alani (Melicope balloui)	Dicot	Endangered
Alani (Melicope haupuensis)	Dicot	Endangered
Alani (Melicope knudsenii)	Dicot	Endangered
Alani (Melicope lydgatei)	Dicot	Endangered
Alani (Melicope mucronulata)	Dicot	Endangered
Alani (Melicope munroi)	Dicot	Endangered
Alani (Melicope ovalis)	Dicot	Endangered
Alani (Melicope pallida)	Dicot	Endangered
Alani (Melicope quadrangularis)	Dicot	Endangered
Alani (Melicope reflexa)	Dicot	Endangered
Alani (Melicope saint-johnii)	Dicot	Endangered
Alani (Melicope zahlbruckneri)	Dicot	Endangered
Allocarya, Calistoga	Dicot	Endangered
Alsinidendron obovatum (ncn)	Dicot	Endangered
Alsinidendron trinerve (ncn)	Dicot	Endangered
Alsinidendron viscosum (ncn)	Dicot	Endangered
Amaranth, Seabeach	Dicot	Threatened
Amaranthus brownii (ncn)	Dicot	Endangered
Ambrosia, San Diego	Dicot	Endangered
Ambrosia, South Texas	Dicot	Endangered
Amphianthus, Little	Dicot	Threatened
'Anaunau (Lepidium arbuscula)	Dicot	Endangered
'Anunu (Sicyos alba)	Dicot	Endangered
Aster, Decurrent False	Dicot	Threatened
Aster, Florida Golden	Dicot	Endangered
Aster, Ruth's Golden	Dicot	Endangered
Aupaka (Isodendrion laurifolium)	Dicot	Endangered
Aupaka (Isodendrion longifolium)	Dicot	Threatened
Avens, Spreading	Dicot	Endangered
'Awikiwiki (Canavalia molokaiensis)	Dicot	Endangered
'Awiwi (Centaurium sebaeoides)	Dicot	Endangered
'Awiwi (Hedyotis cookiana)	Dicot	Endangered
Ayenia, Texas	Dicot	Endangered

Baccharis, Encinitas	Dicot	Threatened
Barbara Buttons, Mohr's	Dicot	Threatened
Barberry, Island	Dicot	Endangered
Barberry, Nevin's	Dicot	Endangered
Beardtongue, Penland	Dicot	Endangered
Bear-poppy, Dwarf	Dicot	Endangered
Bedstraw, El Dorado	Dicot	Endangered
Bedstraw, Island	Dicot	Endangered
Bellflower, Brooksville	Dicot	Endangered
Birch, Virginia Round-leaf	Dicot	Threatened
Bird's-beak, Palmate-bracted	Dicot	Endangered
Bird's-beak, Pennell's	Dicot	Endangered
Bird's-beak, salt marsh	Dicot	Endangered
Bird's-beak, Soft	Dicot	Endangered
Birds-in-a-nest, White	Dicot	Threatened
Bittercress, Small-anthered	Dicot	Endangered
Bladderpod, Dudley Bluffs	Dicot	Threatened
Bladderpod, Kodachrome	Dicot	Endangered
Bladderpod, Lyrate	Dicot	Threatened
Bladderpod, Missouri	Dicot	Threatened
Bladderpod, San Bernardino Mountains	Dicot	Endangered
Bladderpod, Spring Creek	Dicot	Endangered
Bladderpod, White	Dicot	Endangered
Bladderpod, Zapata	Dicot	Endangered
Blazing Star, Ash Meadows	Dicot	Threatened
Blazing Star, Heller's	Dicot	Threatened
Blazing Star, Scrub	Dicot	Endangered
Bluecurls, Hidden Lake	Dicot	Threatened
Blue-star, Kearney's	Dicot	Endangered
Bluet, Roan Mountain	Dicot	Endangered
Bonamia menziesii (ncn)	Dicot	Endangered
Bonamia, Florida	Dicot	Threatened
Broom, San Clemente Island	Dicot	Endangered
Buckwheat, Cushenbury	Dicot	Endangered
Buckwheat, Ione (incl. Irish Hill)	Dicot	Endangered
Buckwheat, Scrub	Dicot	Threatened
Buckwheat, Southern Mountain Wild	Dicot	Threatened
Buckwheat, Steamboat	Dicot	Endangered
Bush-mallow, San Clemente Island	Dicot	Endangered
Bush-mallow, Santa Cruz Island	Dicot	Endangered
Buttercup, Autumn	Dicot	Endangered
Butterfly Plant, Colorado	Dicot	Threatened
Butterweed, Layne's	Dicot	Threatened
Butterwort, Godfrey's	Dicot	Threatened
Button-celery, San Diego	Dicot	Endangered
Cactus, Arizona Hedgehog	Dicot	Endangered
Cactus, Bakersfield	Dicot	Endangered
Cactus, Black Lace	Dicot	Endangered
Cactus, Brady Pincushion	Dicot	Endangered
Cactus, Bunched Cory	Dicot	Threatened
Cactus, Chisos Mountain Hedgehog	Dicot	Threatened

Cactus, Cochise Pincushion	Dicot	Threatened
Cactus, Key Tree	Dicot	Endangered
Cactus, Knowlton	Dicot	Endangered
Cactus, Kuenzler Hedgehog	Dicot	Endangered
Cactus, Lee Pincushion	Dicot	Threatened
Cactus, Lloyd's Mariposa	Dicot	Threatened
Cactus, Mesa Verde	Dicot	Threatened
Cactus, Nellie Cory	Dicot	Endangered
Cactus, Nichol's Turk's Head	Dicot	Endangered
Cactus, Peebles Navajo	Dicot	Endangered
Cactus, Pima Pineapple	Dicot	Endangered
Cactus, San Rafael	Dicot	Endangered
Cactus, Siler Pincushion	Dicot	Threatened
Cactus, Sneed Pincushion	Dicot	Endangered
Cactus, Star	Dicot	Endangered
Cactus, Tobusch Fishhook	Dicot	Endangered
Cactus, Uinta Basin Hookless	Dicot	Threatened
Cactus, Winkler	Dicot	Threatened
Cactus, Wright Fishhook	Dicot	Endangered
Campion, Fringed	Dicot	Endangered
Catchfly, Spalding's	Dicot	Threatened
Cat's-eye, Terlingua Creek	Dicot	Endangered
Ceanothus, Coyote	Dicot	Endangered
Ceanothus, Pine Hill	Dicot	Endangered
Ceanothus, Vail Lake	Dicot	Threatened
Centaury, Spring-loving	Dicot	Threatened
Chaffseed, American	Dicot	Endangered
Chamaesyce Halemanui (ncn)	Dicot	Endangered
Checker-mallow, Keck's	Dicot	Endangered
Checker-mallow, Kenwood Marsh	Dicot	Endangered
Checker-mallow, Nelson's	Dicot	Threatened
Checker-mallow, Pedate	Dicot	Endangered
Checker-mallow, Wenatchee Mountains	Dicot	Endangered
Clarkia, Pismo	Dicot	Endangered
Clarkia, Presidio	Dicot	Endangered
Clarkia, Springville	Dicot	Threatened
Clarkia, Vine Hill	Dicot	Endangered
Cliffrose, Arizona	Dicot	Endangered
Clover, Fleshy Owl's	Dicot	Threatened
Clover, Leafy Prairie	Dicot	Endangered
Clover, Monterey	Dicot	Endangered
Clover, Prairie Bush	Dicot	Threatened
Clover, Running Buffalo	Dicot	Endangered
Clover, Showy Indian	Dicot	Endangered
Coneflower, Smooth	Dicot	Endangered
Coneflower, Tennessee Purple	Dicot	Endangered
Coyote-thistle, Loch Lomond	Dicot	Endangered
Crownbeard, Big-leaved	Dicot	Threatened
Crownscale, San Jacinto Valley	Dicot	Endangered
Cyanea undulata (ncn)	Dicot	Endangered
Cycladenia, Jones	Dicot	Threatened

Daisy, Lakeside	Dicot	Threatened
Daisy, Maguire	Dicot	Threatened
Daisy, Parish's	Dicot	Threatened
Daisy, Willamette	Dicot	Endangered
Dawn-flower, Texas Prairie (=Texas Bitterweed)	Dicot	Endangered
Delissea rhytodisperma (ncn)	Dicot	Endangered
Dogweed, Ashy	Dicot	Endangered
Dropwort, Canby's	Dicot	Endangered
Dubautia latifolia (ncn)	Dicot	Endangered
Dubautia pauciflorula (ncn)	Dicot	Endangered
Dudleya, Conejo	Dicot	Threatened
Dudleya, Marcescent	Dicot	Threatened
Dudleya, Santa Clara Valley	Dicot	Endangered
Dudleya, Santa Cruz Island	Dicot	Threatened
Dudleya, Santa Monica Mountains	Dicot	Threatened
Dudleya, Verity's	Dicot	Threatened
Dwarf-flax, Marin	Dicot	Threatened
Evening-primrose, Antioch Dunes	Dicot	Endangered
Evening-primrose, Eureka Valley	Dicot	Endangered
Evening-primrose, San Benito	Dicot	Threatened
Fiddleneck, Large-flowered	Dicot	Endangered
Flannelbush, Mexican	Dicot	Endangered
Flannelbush, Pine Hill	Dicot	Endangered
Fleabane, Zuni	Dicot	Threatened
Four-o'clock, Macfarlane's	Dicot	Threatened
Frankenia, Johnston's	Dicot	Endangered
Fringe Tree, Pygmy	Dicot	Endangered
Fringepod, Santa Cruz Island	Dicot	Endangered
Fruit, Earth (=geocarpon)	Dicot	Threatened
Geranium, Hawaiian Red-flowered	Dicot	Endangered
Gerardia, Sandplain	Dicot	Endangered
Gilia, Hoffmann's Slender-flowered	Dicot	Endangered
Gilia, Monterey	Dicot	Endangered
Golden Sunburst, Hartweg's	Dicot	Endangered
Goldenrod, Blue Ridge	Dicot	Threatened
Goldenrod, Houghton's	Dicot	Threatened
Goldenrod, Short's	Dicot	Endangered
Goldenrod, White-haired	Dicot	Threatened
Goldfields, Burke's	Dicot	Endangered
Goldfields, Contra Costa	Dicot	Endangered
Gooseberry, Miccosukee	Dicot	Threatened
Gouania hillebrandii (ncn)	Dicot	Endangered
Gouania meyenii (ncn)	Dicot	Endangered
Gouania vitifolia (ncn)	Dicot	Endangered
Gourd, Okeechobee	Dicot	Endangered
Grass, Hairy Orcutt	Dicot	Endangered
Grass, Sacramento Orcutt	Dicot	Endangered
Grass, Slender Orcutt	Dicot	Threatened
Ground-plum, Guthrie's	Dicot	Endangered
Groundsel, San Francisco Peaks	Dicot	Threatened
Gumplant, Ash Meadows	Dicot	Threatened

Haha (Cyanea acuminata)	Dicot	Endangered
Haha (Cyanea asarifolia)	Dicot	Endangered
Haha (Cyanea copelandii ssp. copelandii)	Dicot	Endangered
Haha (Cyanea copelandii ssp. haleakalaensis)	Dicot	Endangered
Haha (Cyanea Crispa) (=Rollandia crispa)	Dicot	Endangered
Haha (Cyanea dunbarii)	Dicot	Endangered
Haha (Cyanea glabra)	Dicot	Endangered
Haha (Cyanea grimesiana ssp. grimesiana)	Dicot	Endangered
Haha (Cyanea grimesiana ssp. obatae)	Dicot	Endangered
Haha (Cyanea hamatiflora ssp. carlsonii)	Dicot	Endangered
Haha (Cyanea hamatiflora ssp. hamatiflora)	Dicot	Endangered
Haha (Cyanea humboldtiana)	Dicot	Endangered
Haha (Cyanea koolauensis)	Dicot	Endangered
Haha (Cyanea longiflora)	Dicot	Endangered
Haha (Cyanea Macrostegia var. gibsonii)	Dicot	Endangered
Haha (Cyanea mannii)	Dicot	Endangered
Haha (Cyanea mceldowneyi)	Dicot	Endangered
Haha (Cyanea pinnatifida)	Dicot	Endangered
Haha (Cyanea platyphylla)	Dicot	Endangered
Haha (Cyanea procera)	Dicot	Endangered
Haha (Cyanea recta)	Dicot	Threatened
Haha (Cyanea remyi)	Dicot	Endangered
Haha (Cyanea shipmanii)	Dicot	Endangered
Haha (Cyanea stictophylla)	Dicot	Endangered
Haha (Cyanea St-Johnii) (=Rollandia St-Johnii)	Dicot	Endangered
Haha (Cyanea superba)	Dicot	Endangered
Ha'Iwale (Cyrtandra crenata)	Dicot	Endangered
Ha'Iwale (Cyrtandra dentata)	Dicot	Endangered
Ha'Iwale (Cyrtandra giffardii)	Dicot	Endangered
Ha'Iwale (Cyrtandra limahuliensis)	Dicot	Threatened
Ha'Iwale (Cyrtandra munroi)	Dicot	Endangered
Ha'Iwale (Cyrtandra polyantha)	Dicot	Endangered
Ha'Iwale (Cyrtandra subumbellata)	Dicot	Endangered
Ha'Iwale (Cyrtandra tintinnabula)	Dicot	Endangered
Ha'Iwale (Cyrtandra viridiflora)	Dicot	Endangered
Haplostachys Haplostachya (ncn)	Dicot	Endangered
Harebells, Avon Park	Dicot	Endangered
Harperella	Dicot	Endangered
Hau Kauhiwi (Hibiscadelphus woodi)	Dicot	Endangered
Hau Kuahiwi (Hibiscadelphus distans)	Dicot	Endangered
Heartleaf, Dwarf-flowered	Dicot	Threatened
Heather, Mountain Golden	Dicot	Threatened
Heau (Exocarpos luteolus)	Dicot	Endangered
Hedyotis degeneri (ncn)	Dicot	Endangered
Hedyotis parvula (ncn)	Dicot	Endangered
Hedyotis St.-Johnii (ncn)	Dicot	Endangered
Hesperomannia arborescens (ncn)	Dicot	Endangered
Hesperomannia arbuscula (ncn)	Dicot	Endangered
Hesperomannia lydgatei (ncn)	Dicot	Endangered
Hibiscus, Clay's	Dicot	Endangered

Holei (Ochrosia kilaueaensis)	Dicot	Endangered
Howellia, Water	Dicot	Threatened
Hypericum, Highlands Scrub	Dicot	Endangered
Iliau (Wilkesia hobdyi)	Dicot	Endangered
Ipomopsis, Holy Ghost	Dicot	Endangered
Ivesia, Ash Meadows	Dicot	Threatened
Jacquemontia, Beach	Dicot	Endangered
Jewelflower, California	Dicot	Endangered
Jewelflower, Tiburon	Dicot	Endangered
Joint-vetch, Sensitive	Dicot	Threatened
Kamakahala (Labordia cyrtandrae)	Dicot	Endangered
Kamakahala (Labordia lydgatei)	Dicot	Endangered
Kamakahala (Labordia tinifolia var. lanaiensis)	Dicot	Endangered
Kamakahala (Labordia tinifolia var. wahiawaen)	Dicot	Endangered
Kamakahala (Labordia triflora)	Dicot	Endangered
Kanaloa kahoolawensis (ncn)	Dicot	Endangered
Kauila (Colubrina oppositifolia)	Dicot	Endangered
Kaulu (Pteralyxia kauaiensis)	Dicot	Endangered
Kio'Ele (Hedyotis coriacea)	Dicot	Endangered
Kiponapona (Phyllostegia racemosa)	Dicot	Endangered
Koki'o (Kokia drynarioides)	Dicot	Endangered
Koki'o (Kokia kauaiensis)	Dicot	Endangered
Koki'o Ke'oke'o (Hibiscus arnottianus ssp. immaculatus)	Dicot	Endangered
Koki'o Ke'oke'o (Hibiscus waimeae ssp. hannerae)	Dicot	Endangered
Kolea (Myrsine juddii)	Dicot	Endangered
Kolea (Myrsine linearifolia)	Dicot	Threatened
Ko'oko'olau (Bidens micrantha ssp. kalealaha)	Dicot	Endangered
Ko'oko'olau (Bidens wiebkei)	Dicot	Endangered
Ko'oloa'ula (Abutilon menziesii)	Dicot	Endangered
Kopa (Hedyotis schlechtendahliana var. remyi)	Dicot	Endangered
Kuawawaenohu (Alsinidendron lychnoides)	Dicot	Endangered
Kulu'I (Nototrichium humile)	Dicot	Endangered
Larkspur, Baker's	Dicot	Endangered
Larkspur, San Clemente Island	Dicot	Endangered
Larkspur, Yellow	Dicot	Endangered
Laukahi Kuahiwi (Plantago hawaiensis)	Dicot	Endangered
Laukahi Kuahiwi (Plantago princeps)	Dicot	Endangered
Laulihilihi (Schiedea stellarioides)	Dicot	Endangered
Layia, Beach	Dicot	Endangered
Lead-plant, Crenulate	Dicot	Endangered
Leather-flower, Alabama	Dicot	Endangered
Leather-flower, Morefield's	Dicot	Endangered
Lessingia, San Francisco	Dicot	Endangered
Lipochaeta venosa (ncn)	Dicot	Endangered
Liveforever, Laguna Beach	Dicot	Threatened
Liveforever, Santa Barbara Island	Dicot	Endangered
Lobelia monostachya (ncn)	Dicot	Endangered

Lobelia niihauensis (ncn)	Dicot	Endangered
Lobelia oahuensis (ncn)	Dicot	Endangered
Locoweed, Fassett's	Dicot	Threatened
Lomatium, Bradshaw's	Dicot	Endangered
Lomatium, Cook's	Dicot	Endangered
Loosestrife, Rough-leaved	Dicot	Endangered
Lousewort, Furbish	Dicot	Endangered
Lupine, Clover	Dicot	Endangered
Lupine, Kincaid's	Dicot	Threatened
Lupine, Nipomo Mesa	Dicot	Endangered
Lupine, Scrub	Dicot	Endangered
Lysimachia filifolia (ncn)	Dicot	Endangered
Lysimachia lydgatei (ncn)	Dicot	Endangered
Lysimachia maxima (ncn)	Dicot	Endangered
Mahoe (Alectryon macrococcus)	Dicot	Endangered
Makou (Peucedanum sandwicense)	Dicot	Threatened
Malacothrix, Island	Dicot	Endangered
Malacothrix, Santa Cruz Island	Dicot	Endangered
Mallow, Kern	Dicot	Endangered
Mallow, Peter's Mountain	Dicot	Endangered
Manioc, Walker's	Dicot	Endangered
Manzanita, Del Mar	Dicot	Endangered
Manzanita, Ione	Dicot	Threatened
Manzanita, Morro	Dicot	Threatened
Manzanita, Pallid	Dicot	Threatened
Manzanita, Santa Rosa Island	Dicot	Endangered
Ma'o Hau Hele (Hibiscus brackenridgei)	Dicot	Endangered
Ma'oli'oli (Schiedea apokremnos)	Dicot	Endangered
Ma'oli'oli (Schiedea kealiae)	Dicot	Endangered
Mapele (Cyrtandra cyaneoides)	Dicot	Endangered
Meadowfoam, Butte County	Dicot	Endangered
Meadowfoam, Large-flowered Woolly	Dicot	Endangered
Meadowfoam, Sebastopol	Dicot	Endangered
Meadowrue, Cooley's	Dicot	Endangered
Mehamehame (Flueggea neowawraea)	Dicot	Endangered
Milkpea, Small's	Dicot	Endangered
Milk-vetch, Applegate's	Dicot	Endangered
Milk-vetch, Ash Meadows	Dicot	Threatened
Milk-vetch, Braunton's	Dicot	Endangered
Milk-vetch, Clara Hunt's	Dicot	Endangered
Milk-vetch, Coachella Valley	Dicot	Endangered
Milk-vetch, Coastal Dunes	Dicot	Endangered
Milk-vetch, Cushenbury	Dicot	Endangered
Milk-vetch, Deseret	Dicot	Threatened
Milk-vetch, Fish Slough	Dicot	Threatened
Milk-vetch, Heliotrope	Dicot	Threatened
Milk-vetch, Holmgren	Dicot	Endangered
Milk-vetch, Jesup's	Dicot	Endangered
Milk-vetch, Lane Mountain	Dicot	Endangered
Milk-vetch, Mancos	Dicot	Endangered
Milk-vetch, Osterhout	Dicot	Endangered

Milk-vetch, Pierson's	Dicot	Threatened
Milk-vetch, Sentry	Dicot	Endangered
Milk-vetch, Shivwits	Dicot	Endangered
Milk-vetch, Triple-ribbed	Dicot	Endangered
Milk-vetch, Ventura Marsh	Dicot	Endangered
Milkweed, Mead's	Dicot	Threatened
Milkweed, Welsh's	Dicot	Threatened
Mint, Garrett's	Dicot	Endangered
Mint, Lakela's	Dicot	Endangered
Mint, Longspurred	Dicot	Endangered
Mint, Otay Mesa	Dicot	Endangered
Mint, San Diego Mesa	Dicot	Endangered
Mint, Scrub	Dicot	Endangered
Monardella, Willowy	Dicot	Endangered
Monkey-flower, Michigan	Dicot	Endangered
Monkshood, Northern Wild	Dicot	Threatened
Morning-glory, Stebbins	Dicot	Endangered
Mountainbalm, Indian Knob	Dicot	Endangered
Mountain-mahogany, Catalina Island	Dicot	Endangered
Munroidendron racemosum (ncn)	Dicot	Endangered
Mustard, Carter's	Dicot	Endangered
Mustard, Penland Alpine Fen	Dicot	Threatened
Mustard, Slender-petaled	Dicot	Endangered
Na'ena'e (Dubautia herbstobatae)	Dicot	Endangered
Na'ena'e (Dubautia plantaginea ssp. humilis)	Dicot	Endangered
Nani Wai'ale'ale (Viola kauaensis var. wahiawaensis)	Dicot	Endangered
Nanu (Gardenia mannii)	Dicot	Endangered
Na'u (Gardenia brighamii)	Dicot	Endangered
Naupaka, Dwarf (Scaevola coriacea)	Dicot	Endangered
Navarretia, Few-flowered	Dicot	Endangered
Navarretia, Many-flowered	Dicot	Endangered
Navarretia, Spreading	Dicot	Threatened
Nehe (Lipochaeta fauriei)	Dicot	Endangered
Nehe (Lipochaeta kamolensis)	Dicot	Endangered
Nehe (Lipochaeta lobata var. leptophylla)	Dicot	Endangered
Nehe (Lipochaeta micrantha)	Dicot	Endangered
Nehe (Lipochaeta tenuifolia)	Dicot	Endangered
Nehe (Lipochaeta waimeaensis)	Dicot	Endangered
Neraudia angulata (ncn)	Dicot	Endangered
Neraudia ovata (ncn)	Dicot	Endangered
Neraudia sericea (ncn)	Dicot	Endangered
Nioi (Eugenia koolauensis)	Dicot	Endangered
Niterwort, Amargosa	Dicot	Endangered
Nohoanu (Geranium multiflorum)	Dicot	Endangered
Oak, Hinckley	Dicot	Threatened
'Oha (Delissea rivularis)	Dicot	Endangered
'Oha (Delissea subcordata)	Dicot	Endangered
'Oha (Delissea undulata)	Dicot	Endangered
'Oha (Lobelia gaudichaudii koolauensis)	Dicot	Endangered
'Oha Wai (Clermontia drepanomorpha)	Dicot	Endangered
'Oha Wai (Clermontia lindseyana)	Dicot	Endangered

'Oha Wai (Clermontia oblongifolia ssp. brevipes)	Dicot	Endangered
'Oha Wai (Clermontia oblongifolia ssp. mauiensis)	Dicot	Endangered
'Oha Wai (Clermontia peleana)	Dicot	Endangered
'Oha Wai (Clermontia pyrularia)	Dicot	Endangered
'Oha Wai (Clermontia samuelii)	Dicot	Endangered
'Ohai (Sesbania tomentosa)	Dicot	Endangered
'Ohe'ohe (Tetraplasandra gymnocarpa)	Dicot	Endangered
'Olulu (Brighamia insignis)	Dicot	Endangered
Opuhe (Urera kaalae)	Dicot	Endangered
Oxytheca, Cushenbury	Dicot	Endangered
Paintbrush, Ash-grey Indian	Dicot	Threatened
Paintbrush, Golden	Dicot	Threatened
Paintbrush, San Clemente Island Indian	Dicot	Endangered
Paintbrush, Soft-leaved	Dicot	Endangered
Paintbrush, Tiburon	Dicot	Endangered
Pamakani (Viola chamissoniana ssp. chamissoniana)	Dicot	Endangered
Pawpaw, Beautiful	Dicot	Endangered
Pawpaw, Four-petal	Dicot	Endangered
Pawpaw, Rugel's	Dicot	Endangered
Penny-cress, Kneeland Prairie	Dicot	Endangered
Pennyroyal, Todsen's	Dicot	Endangered
Penstemon, Blowout	Dicot	Endangered
Pentachaeta, Lyon's	Dicot	Endangered
Pentachaeta, White-rayed	Dicot	Endangered
Phacelia, Clay	Dicot	Endangered
Phacelia, Island	Dicot	Endangered
Phacelia, North Park	Dicot	Endangered
Phlox, Texas Trailing	Dicot	Endangered
Phlox, Yreka	Dicot	Endangered
Phyllostegia hirsuta (ncn)	Dicot	Endangered
Phyllostegia kaalaensis (ncn)	Dicot	Endangered
Phyllostegia knudsenii (ncn)	Dicot	Endangered
Phyllostegia mannii (ncn)	Dicot	Endangered
Phyllostegia mollis (ncn)	Dicot	Endangered
Phyllostegia parviflora (ncn)	Dicot	Endangered
Phyllostegia velutina (ncn)	Dicot	Endangered
Phyllostegia waimeae (ncn)	Dicot	Endangered
Phyllostegia warshaueri (ncn)	Dicot	Endangered
Phyllostegia wawrana (ncn)	Dicot	Endangered
Pilo (Hedyotis mannii)	Dicot	Endangered
Pinkroot, Gentian	Dicot	Endangered
Pitaya, Davis' Green	Dicot	Endangered
Pitcher-plant, Alabama Canebrake	Dicot	Endangered
Pitcher-plant, Green	Dicot	Endangered
Pitcher-plant, Mountain Sweet	Dicot	Endangered
Plum, Scrub	Dicot	Endangered
Po'e (Portulaca sclerocarpa)	Dicot	Endangered
Polygala, Lewton's	Dicot	Endangered
Polygala, Tiny	Dicot	Endangered

Polygonum, Scott's Valley	Dicot	Endangered
Pondberry	Dicot	Endangered
Popcornflower, Rough	Dicot	Endangered
Popolo 'Aiakeakua (Solanum sandwicense)	Dicot	Endangered
Popolo Ku Mai (Solanum incompletum)	Dicot	Endangered
Poppy, Sacramento Prickly	Dicot	Endangered
Poppy-mallow, Texas	Dicot	Endangered
Potato-bean, Price's	Dicot	Threatened
Potentilla, Hickman's	Dicot	Endangered
Prickly-apple, Fragrant	Dicot	Endangered
Primrose, Maguire	Dicot	Threatened
Pua'ala (Brighamia rockii)	Dicot	Endangered
Pussypaws, Mariposa	Dicot	Threatened
Rattleweed, Hairy	Dicot	Endangered
Reed-mustard, Barneby	Dicot	Endangered
Reed-mustard, Clay	Dicot	Threatened
Reed-mustard, Shrubby	Dicot	Endangered
Remya kauaiensis (ncn)	Dicot	Endangered
Remya montgomeryi (ncn)	Dicot	Endangered
Remya, Maui	Dicot	Endangered
Rhododendron, Chapman	Dicot	Endangered
Ridge-cress (=Pepper-cress), Barneby	Dicot	Endangered
Rock-cress, Hoffmann's	Dicot	Endangered
Rock-cress, Large (=Braun's)	Dicot	Endangered
Rock-cress, McDonald's	Dicot	Endangered
Rock-cress, Santa Cruz Island	Dicot	Endangered
Rock-cress, Shale Barren	Dicot	Endangered
Rock-cress, Small	Dicot	Endangered
Rosemary, Apalachicola	Dicot	Endangered
Rosemary, Cumberland	Dicot	Threatened
Rosemary, Etonia	Dicot	Endangered
Rosemary, Short-leaved	Dicot	Endangered
Roseroot, Leedy's	Dicot	Threatened
Rush-pea, Slender	Dicot	Endangered
Rush-rose, Island	Dicot	Threatened
Sandalwood, Lanai (='Iliahi)	Dicot	Endangered
Sandlace	Dicot	Endangered
Sand-verbena, Large-fruited	Dicot	Endangered
Sandwort, Bear Valley	Dicot	Threatened
Sandwort, Cumberland	Dicot	Endangered
Sandwort, Marsh	Dicot	Endangered
Sanicula mariversa (ncn)	Dicot	Endangered
Sanicula purpurea (ncn)	Dicot	Endangered
Schiedea haleakalensis (ncn)	Dicot	Endangered
Schiedea helleri (ncn)	Dicot	Endangered
Schiedea hookeri (ncn)	Dicot	Endangered
Schiedea kaalae (ncn)	Dicot	Endangered
Schiedea kauaiensis (ncn)	Dicot	Endangered
Schiedea lydgatei (ncn)	Dicot	Endangered
Schiedea membranacea (ncn)	Dicot	Endangered
Schiedea nuttallii (ncn)	Dicot	Endangered

Schiedea sarmentosa (ncn)	Dicot	Endangered
Schiedea spergulina var. leiopoda (ncn)	Dicot	Endangered
Schiedea spergulina var. spergulina (ncn)	Dicot	Threatened
Schiedea verticillata (ncn)	Dicot	Endangered
Schiedea, Diamond Head (Schiedea adamantis)	Dicot	Endangered
Sea-blite, California	Dicot	Endangered
Silene alexandri (ncn)	Dicot	Endangered
Silene hawaiiensis (ncn)	Dicot	Threatened
Silene lanceolata (ncn)	Dicot	Endangered
Silene perlmanii (ncn)	Dicot	Endangered
Silversword, Haleakala ('Ahinahina)	Dicot	Threatened
Silversword, Ka'u (Argyroxiphium kauense)	Dicot	Endangered
Silversword, Mauna Kea ('Ahinahina)	Dicot	Endangered
Skullcap, Florida	Dicot	Threatened
Skullcap, Large-flowered	Dicot	Threatened
Snakeroot	Dicot	Endangered
Sneezeweed, Virginia	Dicot	Threatened
Snowbells, Texas	Dicot	Endangered
Spermolepis hawaiiensis (ncn)	Dicot	Endangered
Spineflower, Ben Lomond	Dicot	Endangered
Spineflower, Howell's	Dicot	Endangered
Spineflower, Monterey	Dicot	Threatened
Spineflower, Orcutt's	Dicot	Endangered
Spineflower, Robust	Dicot	Endangered
Spineflower, Scotts Valley	Dicot	Endangered
Spineflower, Slender-horned	Dicot	Endangered
Spineflower, Sonoma	Dicot	Endangered
Spiraea, Virginia	Dicot	Threatened
Spurge, Deltoid	Dicot	Endangered
Spurge, Garber's	Dicot	Threatened
Spurge, Hoover's	Dicot	Threatened
Spurge, Telephus	Dicot	Threatened
Stenogyne angustifolia (ncn)	Dicot	Endangered
Stenogyne bifida (ncn)	Dicot	Endangered
Stenogyne campanulata (ncn)	Dicot	Endangered
Stenogyne kanehoana (ncn)	Dicot	Endangered
Stickseed, Showy	Dicot	Endangered
Stickyseed, Baker's	Dicot	Endangered
Stonecrop, Lake County	Dicot	Endangered
Sumac, Michaux's	Dicot	Endangered
Sunflower, Pecos	Dicot	Threatened
Sunflower, San Mateo Woolly	Dicot	Endangered
Sunflower, Schweinitz's	Dicot	Endangered
Sunray, Ash Meadows	Dicot	Threatened
Taraxacum, California	Dicot	Endangered
Tarplant, Gaviota	Dicot	Endangered
Tarplant, Otay	Dicot	Threatened
Tarplant, Santa Cruz	Dicot	Threatened
Tetramolopium arenarium (ncn)	Dicot	Endangered
Tetramolopium capillare (ncn)	Dicot	Endangered
Tetramolopium filiforme (ncn)	Dicot	Endangered

Tetramolopium lepidotum ssp. lepidotum (ncn)	Dicot	Endangered
Tetramolopium remyi (ncn)	Dicot	Endangered
Tetramolopium rockii (ncn)	Dicot	Threatened
Thelypody, Howell's Spectacular	Dicot	Threatened
Thistle, Chorro creek Bog	Dicot	Endangered
Thistle, Fountain	Dicot	Endangered
Thistle, La Graciosa	Dicot	Endangered
Thistle, Pitcher's	Dicot	Threatened
Thistle, Sacramento Mountains	Dicot	Threatened
Thistle, Suisun	Dicot	Endangered
Thornmint, San Diego	Dicot	Threatened
Thornmint, San Mateo	Dicot	Endangered
Townsendia, Last Chance	Dicot	Threatened
Trematolobelia singularis (ncn)	Dicot	Endangered
Tuctoria, Green's	Dicot	Endangered
Twinpod, Dudley Bluffs	Dicot	Threatened
Uhiuhi (Caesalpinia kavaiensis)	Dicot	Endangered
Ulihi (Phyllostegia glabra var. lanaiensis)	Dicot	Endangered
Umbel, Huachuca Water	Dicot	Endangered
Vervain, California	Dicot	Threatened
Vetch, Hawaiian (Vicia menziesii)	Dicot	Endangered
Vigna o-wahuensis (ncn)	Dicot	Endangered
Viola helenae (ncn)	Dicot	Endangered
Viola lanaiensis (ncn)	Dicot	Endangered
Viola oahuensis (ncn)	Dicot	Endangered
Wahine Noho Kula (Isodendrion pyrifolium)	Dicot	Endangered
Wallflower, Ben Lomond	Dicot	Endangered
Wallflower, Contra Costa	Dicot	Endangered
Wallflower, Menzie's	Dicot	Endangered
Warea, Wide-leaf	Dicot	Endangered
Watercress, Gambel's	Dicot	Endangered
Water-willow, Cooley's	Dicot	Endangered
Whitlow-wort, Papery	Dicot	Threatened
Wild-buckwheat, Clay-loving	Dicot	Endangered
Wild-buckwheat, Gypsum	Dicot	Threatened
Wings, Pigeon	Dicot	Threatened
Wire-lettuce, Malheur	Dicot	Endangered
Wireweed	Dicot	Endangered
Woodland-star, San Clemente Island	Dicot	Endangered
Woolly-star, Santa Ana River	Dicot	Endangered
Woolly-threads, San Joaquin	Dicot	Endangered
Xylosma crenatum (ncn)	Dicot	Endangered
Yellowhead, Desert	Dicot	Threatened
Yerba Santa, Lompoc	Dicot	Endangered
Ziziphus, Florida	Dicot	Endangered
Asplenium fragile var. insulare (ncn)	Ferns	Endangered
Diellia erecta (ncn)	Ferns	Endangered
Diellia falcata (ncn)	Ferns	Endangered
Diellia pallida (ncn)	Ferns	Endangered
Diellia unisora (ncn)	Ferns	Endangered

Diplazium molokaiense (ncn)	Ferns	Endangered
Fern, Alabama Streak-sorus	Ferns	Threatened
Fern, Aleutian Shield	Ferns	Endangered
Fern, American hart's-tongue	Ferns	Threatened
Fern, Pendant Kihi (Adenophorus periens)	Ferns	Endangered
'Ihi'Ihi (Marsilea villosa)	Ferns	Endangered
Pauoa (Ctenitis squamigera)	Ferns	Endangered
Pteris lidgatei (ncn)	Ferns	Endangered
Quillwort, Black-spored	Ferns	Endangered
Quillwort, Louisiana	Ferns	Endangered
Quillwort, Mat-forming	Ferns	Endangered
Wawae'Iole (Phlegmariurus (=Huperzia) mannii)	Ferns	Endangered
Wawae'Iole (Phlegmariurus (=Lycopodium) nutans)	Ferns	Endangered
Catfish, Yaqui	Fish	Threatened
Cavefish, Alabama	Fish	Endangered
Cavefish, Ozark	Fish	Threatened
Chub, Bonytail	Fish	Endangered
Chub, Borax Lake	Fish	Endangered
Chub, Chihuahua	Fish	Threatened
Chub, Gila	Fish	Endangered
Chub, Humpback	Fish	Endangered
Chub, Hutton Tui	Fish	Threatened
Chub, Mohave Tui	Fish	Endangered
Chub, Oregon	Fish	Endangered
Chub, Owens Tui	Fish	Endangered
Chub, Pahranagat Roundtail	Fish	Endangered
Chub, Slender	Fish	Threatened
Chub, Sonora	Fish	Threatened
Chub, Spotfin	Fish	Threatened
Chub, Virgin River	Fish	Endangered
Chub, Yaqui	Fish	Endangered
Cui-ui	Fish	Endangered
Dace, Ash Meadows Speckled	Fish	Endangered
Dace, Blackside	Fish	Threatened
Dace, Clover Valley Speckled	Fish	Endangered
Dace, Desert	Fish	Threatened
Dace, Foskett Speckled	Fish	Threatened
Dace, Independence Valley Speckled	Fish	Endangered
Dace, Kendall Warm Springs	Fish	Endangered
Dace, Moapa	Fish	Endangered
Darter, Amber	Fish	Endangered
Darter, Bayou	Fish	Threatened
Darter, Bluemask (=jewel)	Fish	Endangered
Darter, Boulder	Fish	Endangered
Darter, Cherokee	Fish	Threatened
Darter, Duskytail	Fish	Endangered
Darter, Etowah	Fish	Endangered
Darter, Fountain	Fish	Endangered
Darter, Goldline	Fish	Threatened
Darter, Leopard	Fish	Threatened

Darter, Maryland	Fish	Endangered
Darter, Niangua	Fish	Threatened
Darter, Okaloosa	Fish	Endangered
Darter, Relict	Fish	Endangered
Darter, Slackwater	Fish	Threatened
Darter, Snail	Fish	Threatened
Darter, Vermilion	Fish	Endangered
Darter, Watercress	Fish	Endangered
Gambusia, Big Bend	Fish	Endangered
Gambusia, Clear Creek	Fish	Endangered
Gambusia, Pecos	Fish	Endangered
Gambusia, San Marcos	Fish	Endangered
Goby, Tidewater	Fish	Endangered
Logperch, Conasauga	Fish	Endangered
Logperch, Roanoke	Fish	Endangered
Madtom, Neosho	Fish	Threatened
Madtom, Pygmy	Fish	Endangered
Madtom, Scioto	Fish	Endangered
Madtom, Smoky	Fish	Endangered
Madtom, Yellowfin	Fish	Threatened
Minnow, Devils River	Fish	Threatened
Minnow, Loach	Fish	Threatened
Minnow, Rio Grande Silvery	Fish	Endangered
Poolfish, Pahrump (= Pahrump Killifish)	Fish	Endangered
Pupfish, Ash Meadows Amargosa	Fish	Endangered
Pupfish, Comanche Springs	Fish	Endangered
Pupfish, Desert	Fish	Endangered
Pupfish, Devils Hole	Fish	Endangered
Pupfish, Leon Springs	Fish	Endangered
Pupfish, Owens	Fish	Endangered
Pupfish, Warm Springs	Fish	Endangered
Salmon, Atlantic	Fish	Endangered
Salmon, Chinook (California Coastal Run)	Fish	Threatened
Salmon, Chinook (Central Valley Fall Run)	Fish	Threatened
Salmon, Chinook (Central Valley Spring Run)	Fish	Threatened
Salmon, Chinook (Lower Columbia River)	Fish	Threatened
Salmon, Chinook (Puget Sound)	Fish	Threatened
Salmon, Chinook (Sacramento River Winter Run)	Fish	Endangered
Salmon, Chinook (Snake River Fall Run)	Fish	Threatened
Salmon, Chinook (Snake River spring/summer)	Fish	Threatened
Salmon, Chinook (Upper Columbia River Spring)	Fish	Endangered
Salmon, Chinook (Upper Willamette River)	Fish	Threatened
Salmon, Chum (Columbia River population)	Fish	Threatened
Salmon, Chum (Hood Canal Summer population)	Fish	Threatened
Salmon, Coho (Central California Coast population)	Fish	Endangered
Salmon, Coho (Southern OR/Northern CA Coast)	Fish	Threatened

Salmon, Sockeye (Ozette Lake population)	Fish	Threatened
Salmon, Sockeye (Snake River population)	Fish	Endangered
Sawfish, Smalltooth	Fish	Endangered
Sculpin, Pygmy	Fish	Threatened
Shiner, Arkansas River	Fish	Threatened
Shiner, Beautiful	Fish	Threatened
Shiner, Blue	Fish	Threatened
Shiner, Cahaba	Fish	Endangered
Shiner, Cape Fear	Fish	Endangered
Shiner, Palezone	Fish	Endangered
Shiner, Pecos Bluntnose	Fish	Threatened
Shiner, Topeka	Fish	Endangered
Silverside, Waccamaw	Fish	Threatened
Smelt, Delta	Fish	Threatened
Spikedace	Fish	Threatened
Spinedace, Big Spring	Fish	Threatened
Spinedace, Little Colorado	Fish	Threatened
Spinedace, White River	Fish	Endangered
Springfish, Hiko White River	Fish	Endangered
Springfish, Railroad Valley	Fish	Threatened
Springfish, White River	Fish	Endangered
Squawfish, Colorado	Fish	Endangered
Steelhead, (California Central Valley population)	Fish	Threatened
Steelhead, (Central California Coast population)	Fish	Threatened
Steelhead, (Lower Columbia River population)	Fish	Threatened
Steelhead, (Middle Columbia River population)	Fish	Threatened
Steelhead, (Northern California population)	Fish	Threatened
Steelhead, (Snake River Basin population)	Fish	Threatened
Steelhead, (South-Central California population)	Fish	Threatened
Steelhead, (Southern California population)	Fish	Endangered
Steelhead, (Upper Columbia River population)	Fish	Threatened
Steelhead, (Upper Willamette River population)	Fish	Threatened
Steelhead, Puget Sound	Fish	Threatened
Stickleback, Unarmored Threespine	Fish	Endangered
Sturgeon, Alabama	Fish	Endangered
Sturgeon, green	Fish	Threatened
Sturgeon, Gulf	Fish	Threatened
Sturgeon, Pallid	Fish	Endangered
Sturgeon, Shortnose	Fish	Endangered
Sturgeon, White	Fish	Endangered
Sucker, June	Fish	Endangered
Sucker, Lost River	Fish	Endangered
Sucker, Modoc	Fish	Endangered
Sucker, Razorback	Fish	Endangered
Sucker, Santa Ana	Fish	Threatened
Sucker, Shortnose	Fish	Endangered

Sucker, Warner	Fish	Threatened
Topminnow, Gila (Yaqui)	Fish	Endangered
Trout, Apache	Fish	Threatened
Trout, Bull	Fish	Threatened
Trout, Bull (Columbia River population)	Fish	Threatened
Trout, Bull (Klamath River population)	Fish	Threatened
Trout, Gila	Fish	Endangered
Trout, Greenback Cutthroat	Fish	Threatened
Trout, Lahontan Cutthroat	Fish	Threatened
Trout, Little Kern Golden	Fish	Threatened
Trout, Paiute Cutthroat	Fish	Threatened
Woundfin	Fish	Endangered
Ambersnail, Kanab	Gastropod	Endangered
Campeloma, Slender	Gastropod	Endangered
Cavesnail, Tumbling Creek	Gastropod	Endangered
Elimia, Lacy	Gastropod	Threatened
Limpet, Banbury Springs	Gastropod	Endangered
Marstonia, Royal (=Royal Snail)	Gastropod	Endangered
Pebblesnail, Flat	Gastropod	Endangered
Riversnail, Anthony's	Gastropod	Endangered
Rocksnail, Painted	Gastropod	Threatened
Rocksnail, Plicate	Gastropod	Endangered
Rocksnail, Round	Gastropod	Threatened
Shagreen, Magazine Mountain	Gastropod	Threatened
Snail, Armored	Gastropod	Endangered
Snail, Bliss Rapids	Gastropod	Threatened
Snail, Chittenango Ovate Amber	Gastropod	Threatened
Snail, Flat-spired Three-toothed	Gastropod	Threatened
Snail, Iowa Pleistocene	Gastropod	Endangered
Snail, Lioplax Cylindrical	Gastropod	Endangered
Snail, Morro Shoulderband	Gastropod	Endangered
Snail, Newcomb's	Gastropod	Threatened
Snail, Noonday	Gastropod	Threatened
Snail, O'ahu Tree (Achatinella abbreviata)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella apexfulva)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella bellula)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella buddii)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella bulimoides)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella byronii)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella caesia)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella casta)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella cestus)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella concavospira)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella curta)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella decipiens)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella decora)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella dimorpha)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella elegans)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella fulgens)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella fuscobasis)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella juddii)	Gastropod	Endangered

Snail, O'ahu Tree (Achatinella juncea)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella lehuiensis)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella leucorraphe)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella lila)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella livida)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella lorata)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella mustelina)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella papyracea)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella phaeozona)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella pulcherrima)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella pupukanioe)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella rosea)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella sowerbyana)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella spaldingi)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella stewartii)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella swiftii)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella taeniolata)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella thaanumi)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella turgida)	Gastropod	Endangered
Snail, O'ahu Tree (Achatinella valida)	Gastropod	Endangered
Snail, Painted Snake Coiled Forest	Gastropod	Threatened
Snail, Pecos Assiminea	Gastropod	Endangered
Snail, Snake River Physa	Gastropod	Endangered
Snail, Stock Island Tree	Gastropod	Threatened
Snail, Tulotoma	Gastropod	Endangered
Snail, Utah Valvata	Gastropod	Endangered
Snail, Virginia Fringed Mountain	Gastropod	Endangered
Springsnail, Alamosa	Gastropod	Endangered
Springsnail, Bruneau Hot	Gastropod	Endangered
Springsnail, Koster's	Gastropod	Endangered
Springsnail, Roswell	Gastropod	Endangered
Springsnail, Socorro	Gastropod	Endangered
Beetle, American Burying	Insect	Endangered
Beetle, Coffin Cave Mold	Insect	Endangered
Beetle, Comal Springs Dryopid	Insect	Endangered
Beetle, Comal Springs Riffle	Insect	Endangered
Beetle, Delta Green Ground	Insect	Threatened
Beetle, Helotes Mold	Insect	Endangered
Beetle, Hungerford's Crawling Water	Insect	Endangered
Beetle, Kretschmarr Cave Mold	Insect	Endangered
Beetle, Mount Hermon June	Insect	Endangered
Beetle, Northeastern Beach Tiger	Insect	Threatened
Beetle, Ohlone Tiger	Insect	Endangered
Beetle, Puritan Tiger	Insect	Threatened
Beetle, Salt Creek Tiger	Insect	Endangered
Beetle, Tooth Cave Ground	Insect	Endangered
Beetle, Valley Elderberry Longhorn	Insect	Threatened
Butterfly, Bay Checkerspot (Wright's euphydryas)	Insect	Threatened
Butterfly, Behren's Silverspot	Insect	Endangered
Butterfly, Callippe Silverspot	Insect	Endangered
Butterfly, El Segundo Blue	Insect	Endangered

Butterfly, Fender's Blue	Insect	Endangered
Butterfly, Karner Blue	Insect	Endangered
Butterfly, Lange's Metalmark	Insect	Endangered
Butterfly, Lotis Blue	Insect	Endangered
Butterfly, Mission Blue	Insect	Endangered
Butterfly, Mitchell's Satyr	Insect	Endangered
Butterfly, Myrtle's Silverspot	Insect	Endangered
Butterfly, Oregon Silverspot	Insect	Threatened
Butterfly, Palos Verdes Blue	Insect	Endangered
Butterfly, Quino Checkerspot	Insect	Endangered
Butterfly, Saint Francis' Satyr	Insect	Endangered
Butterfly, San Bruno Elfin	Insect	Endangered
Butterfly, Schaus Swallowtail	Insect	Endangered
Butterfly, Smith's Blue	Insect	Endangered
Butterfly, Uncompahgre Fritillary	Insect	Endangered
Dragonfly, Hine's Emerald	Insect	Endangered
Fly, Delhi Sands Flower-loving	Insect	Endangered
Grasshopper, Zayante Band-winged	Insect	Endangered
Moth, Blackburn's Sphinx	Insect	Endangered
Moth, Kern Primrose Sphinx	Insect	Threatened
Naucorid, Ash Meadows	Insect	Threatened
Rhadine exilis (ncn)	Insect	Endangered
Rhadine infernalis (ncn)	Insect	Endangered
Skipper, Carson Wandering	Insect	Endangered
Skipper, Laguna Mountain	Insect	Endangered
Skipper, Pawnee Montane	Insect	Threatened
Cladonia, Florida Perforate	Lichen	Endangered
Lichen, Rock Gnome	Lichen	Endangered
Bat, Gray	Mammal	Endangered
Bat, Hawaiian Hoary	Mammal	Endangered
Bat, Indiana	Mammal	Endangered
Bat, Lesser (=Sanborn's) Long-nosed	Mammal	Endangered
Bat, Mexican Long-nosed	Mammal	Endangered
Bat, Ozark Big-eared	Mammal	Endangered
Bat, Virginia Big-eared	Mammal	Endangered
Bear, Grizzly	Mammal	Threatened
Bear, Louisiana Black	Mammal	Threatened
Caribou, Woodland	Mammal	Endangered
Deer, Columbian White-tailed	Mammal	Endangered
Deer, Key	Mammal	Endangered
Ferret, Black-footed	Mammal	Endangered
Fox, San Joaquin Kit	Mammal	Endangered
Fox, San Miguel Island	Mammal	Endangered
Fox, Santa Catalina Island	Mammal	Endangered
Fox, Santa Cruz Island	Mammal	Endangered
Fox, Santa Rosa Island	Mammal	Endangered
Jaguar	Mammal	Endangered
Jaguarundi, Gulf Coast	Mammal	Endangered
Jaguarundi, Sinaloan	Mammal	Endangered
Kangaroo Rat, Fresno	Mammal	Endangered
Kangaroo Rat, Giant	Mammal	Endangered

Kangaroo Rat, Morro Bay	Mammal	Endangered
Kangaroo Rat, San Bernardino Merriam's	Mammal	Endangered
Kangaroo Rat, Stephens'	Mammal	Endangered
Kangaroo Rat, Tipton	Mammal	Endangered
Lynx, Canada	Mammal	Threatened
Mountain Beaver, Point Arena	Mammal	Endangered
Mouse, Alabama Beach	Mammal	Endangered
Mouse, Anastasia Island Beach	Mammal	Endangered
Mouse, Choctawhatchee Beach	Mammal	Endangered
Mouse, Key Largo Cotton	Mammal	Endangered
Mouse, Pacific Pocket	Mammal	Endangered
Mouse, Perdido Key Beach	Mammal	Endangered
Mouse, Preble's Meadow Jumping	Mammal	Threatened
Mouse, Salt Marsh Harvest	Mammal	Endangered
Mouse, Southeastern Beach	Mammal	Threatened
Mouse, St. Andrew Beach	Mammal	Endangered
Ocelot	Mammal	Endangered
Panther, Florida	Mammal	Endangered
Prairie Dog, Utah	Mammal	Threatened
Pronghorn, Sonoran	Mammal	Endangered
Rabbit, Lower Keys Marsh	Mammal	Endangered
Rabbit, Pygmy	Mammal	Endangered
Rabbit, Riparian Brush	Mammal	Endangered
Rice Rat (=Silver Rice Rat)	Mammal	Endangered
Sheep, Peninsular Bighorn	Mammal	Endangered
Sheep, Sierra Nevada Bighorn	Mammal	Endangered
Shrew, Buena Vista Lake Ornate	Mammal	Endangered
Squirrel, Carolina Northern Flying	Mammal	Endangered
Squirrel, Delmarva Peninsula Fox	Mammal	Endangered
Squirrel, Mount Graham Red	Mammal	Endangered
Squirrel, Northern Idaho Ground	Mammal	Threatened
Squirrel, Virginia Northern Flying	Mammal	Endangered
Vole, Amargosa	Mammal	Endangered
Vole, Florida Salt Marsh	Mammal	Endangered
Vole, Hualapai Mexican	Mammal	Endangered
Wolf, Gray	Mammal	Endangered
Wolf, Gray	Mammal	Threatened
Woodrat, Key Largo	Mammal	Endangered
Woodrat, Riparian	Mammal	Endangered
Manatee, West Indian	Marine mml	Endangered
Otter, Northern Sea	Marine mml	Threatened
Otter, Southern Sea	Marine mml	Threatened
Seal, Caribbean Monk	Marine mml	Endangered
Seal, Guadalupe Fur	Marine mml	Threatened
Seal, Hawaiian Monk	Marine mml	Endangered
Sea-lion, Steller (eastern)	Marine mml	Threatened
Whale, Finback	Marine mml	Endangered
Whale, Humpback	Marine mml	Endangered
Whale, northern right	Marine mml	Endangered
Alopecurus, Sonoma	Monocot	Endangered
Amole, Cammatta Canyon	Monocot	Threatened

Amole, Purple	Monocot	Threatened
Arrowhead, Bunched	Monocot	Endangered
Beaked-rush, Knieskern's	Monocot	Threatened
Beargrass, Britton's	Monocot	Endangered
Beauty, Harper's	Monocot	Endangered
Bluegrass, Hawaiian	Monocot	Endangered
Bluegrass, Mann's (Poa mannii)	Monocot	Endangered
Bluegrass, Napa	Monocot	Endangered
Bluegrass, San Bernardino	Monocot	Endangered
Brodiaea, Chinese Camp	Monocot	Threatened
Brodiaea, Thread-leaved	Monocot	Threatened
Bulrush, Northeastern (=Barbed Bristle)	Monocot	Endangered
Fritillary, Gentner's	Monocot	Endangered
Gahnia Lanaiensis (ncn)	Monocot	Endangered
Grass, California Orcutt	Monocot	Endangered
Grass, Colusa	Monocot	Threatened
Grass, Eureka Dune	Monocot	Endangered
Grass, Fosberg's Love	Monocot	Endangered
Grass, San Joaquin Valley Orcutt	Monocot	Threatened
Grass, Solano	Monocot	Endangered
Grass, Tennessee Yellow-eyed	Monocot	Endangered
Hala Pepe (Pleomele hawaiiensis)	Monocot	Endangered
Hilo Ischaemum (Ischaemum byrone)	Monocot	Endangered
Iris, Dwarf Lake	Monocot	Threatened
Irisette, White	Monocot	Endangered
Kamanomano (Cenchrus agrimonioides)	Monocot	Endangered
Ladies'-tresses, Canelo Hills	Monocot	Endangered
Ladies'-tresses, Navasota	Monocot	Endangered
Ladies'-tresses, Ute	Monocot	Threatened
Lau'ehu (Panicum niihauense)	Monocot	Endangered
Lily, Minnesota Trout	Monocot	Endangered
Lily, Pitkin Marsh	Monocot	Endangered
Lily, Western	Monocot	Endangered
Lo`ulu (Pritchardia affinis)	Monocot	Endangered
Lo`ulu (Pritchardia kaalae)	Monocot	Endangered
Lo`ulu (Pritchardia munroi)	Monocot	Endangered
Lo`ulu (Pritchardia napaliensis)	Monocot	Endangered
Lo`ulu (Pritchardia remota)	Monocot	Endangered
Lo`ulu (Pritchardia schattaueri)	Monocot	Endangered
Lo`ulu (Pritchardia viscosa)	Monocot	Endangered
Mariscus fauriei (ncn)	Monocot	Endangered
Mariscus pennatiformis (ncn)	Monocot	Endangered
Onion, Munz's	Monocot	Endangered
Orchid, Eastern Prairie Fringed	Monocot	Threatened
Orchid, Western Prairie Fringed	Monocot	Threatened
Panicgrass, Carter's (Panicum fauriei var.carteri)	Monocot	Endangered
Pink, Swamp	Monocot	Threatened
Piperia, Yadon's	Monocot	Endangered
Platanthera holochila (ncn)	Monocot	Endangered
Poa siphonoglossa (ncn)	Monocot	Endangered
Pogonia, Small Whorled	Monocot	Threatened

Pondweed, Little Aguja Creek	*Monocot*	*Endangered*
Pu'uka'a (Cyperus trachysanthos)	*Monocot*	Endangered
Seagrass, Johnson's	Monocot	Threatened
Sedge, Golden	Monocot	Endangered
Sedge, Navajo	Monocot	Threatened
Sedge, White	Monocot	Endangered
Trillium, Persistent	Monocot	Endangered
Trillium, Relict	Monocot	Endangered
Wahane (Pritchardia aylmer-robinsonii)	Monocot	Endangered
Water-plantain, Kral's	Monocot	Threatened
Wild-rice, Texas	Monocot	Endangered
Crocodile, American	Reptile	Threatened
Lizard, Blunt-nosed Leopard	Reptile	Endangered
Lizard, Coachella Valley Fringe-toed	Reptile	Threatened
Lizard, Island Night	Reptile	Threatened
Rattlesnake, New Mexican Ridge-nosed	Reptile	Threatened
Sea turtle, green	Reptile	Endangered
Sea turtle, hawksbill	Reptile	Endangered
Sea turtle, Kemp's ridley	Reptile	Endangered
Sea turtle, leatherback	Reptile	Endangered
Sea turtle, loggerhead	Reptile	Threatened
Sea turtle, olive ridley	Reptile	Threatened
Skink, Blue-tailed Mole	Reptile	Threatened
Skink, Sand	Reptile	Threatened
Snake, Atlantic Salt Marsh	Reptile	Threatened
Snake, Concho Water	Reptile	Threatened
Snake, Eastern Indigo	Reptile	Threatened
Snake, Giant Garter	Reptile	Threatened
Snake, Lake Erie Water	Reptile	Threatened
Snake, Northern Copperbelly Water	Reptile	Threatened
Snake, San Francisco Garter	Reptile	Endangered
Tortoise, Desert	Reptile	Threatened
Tortoise, Gopher	Reptile	Threatened
Turtle, Alabama Red-bellied	Reptile	Endangered
Turtle, Bog (Northern population)	Reptile	Threatened
Turtle, Flattened Musk	Reptile	Threatened
Turtle, Plymouth Red-bellied	Reptile	Endangered
Turtle, Ringed Sawback	Reptile	Threatened
Turtle, Yellow-blotched Map	Reptile	Threatened
Whipsnake (=Striped Racer), Alameda	Reptile	Threatened